THE IRON TRADE REVIEW

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Tremendous Demand for Steel Bars

And Other Material for Export—Billet Situation Easier—Important Steel Plant Additions Announced

TREMENDOUS demand for bars, machinery and motor trucks for export continues to be the leading feature of the market. There is little, if any, change in domestic demand. Interesting announcements have been made in regard to additions to the plants of the Bethlehem Steel Co. and the Jones & Laughlin Steel Co. The former include a large increase in the capacity for standard structural material and will require about 6,000 tons of structural steel for the construction, which is to be done by the McClintic-Marshall Co. The Jones & Laughlin Steel Co. will build a modern steel pipe mill at its Aliquippa works.

Billets

The Algoma Steel Corporation, of Sault Ste. Marie, Ont., is offering some billets in American markets. It is understood that the present low rate of foreign exchange has resulted in some cancellations of orders for semi-finished materials and the situation is easier.

Machinery

Large purchases of machine tools continue to be made for export. The principal orders recently have come from France, Italy and Russia, and during the past week or ten days have included from 1,000 to 1,500 lathes, in addition to many screw machines and other tools. Concerns which recently entered into the manufacture of machine tools are now taking many orders and are able in some cases to deliver as early as October. One inquiry which appeared during the week was for 5,000 lathes. Strictly domestic buying is not heavy.

Bars

Inquiries for very heavy tonnages of steel bars for the manufacture of shrapnel are pending, including one for 33,000 tons from the Hydraulic Pressed Steel Co., Cleveland. Leading makers of bars are well provided with orders and are not inclined to take on additional tonnages except at considerably higher prices. The question of delivery is a very important one in all of this business.

Pig Iron Production

Production of coke and anthracite pig iron for August amounted to 2,774,825 tons, the largest output since May, 1913. The great activity of steel plants is shown by the fact that two-thirds of the increase was in steel-making iron, which showed a gain of 144,839 tons, while merchant stacks recorded a gain of 56,997 tons.

Pig Iron

Sellers continue in control of the pig iron market and a fair volume of business is being transacted. Prices are firm and $15 is now the minimum for No. 2X or plain at Buffalo. In southern iron, $11 can still be done on No. 2 foundry and the market is not active.

Iron Ore

Shipments of iron ore from the Lake Superior regions in August amounted to 8,081,117 tons and it is probable that the shipments for September will be fully as large. It is now estimated that the movement for the season will amount to 45,000,000 tons. Considerably higher prices are being paid for domestic manganese ores.

Railroad Buying

Railroads are showing more interest in placing their orders for rails and the Pennsylvania is figuring on its next year's requirements. Orders actually entered make a good tonnage. The American Locomotive Co. has taken an order for 25 locomotives for shipment to Spain.

Shapes and Plates

Contracts for new buildings are not numerous, but shipments of shapes and plates are heavy. The Stroebel Steel Construction Co., Chicago, is the low bidder for the general contract for the Chicago street viaduct, Buffalo. Two 9,000-ton merchant vessels have been awarded to the Newport News Ship Building & Dry Dock Co. Although on bars and shapes 1.35c, Pittsburgh, is the prevailing quotation, 1.25c can still be done on plates. Prices of nuts and bolts have again advanced, on account of the high price of bars.

THE OPEN HEARTH

Present Problems of Steel-Making

THERE is a growing appreciation in high places in the iron and steel industry that some important problems of manufacturing will have to be faced if the present expansion of production is continued through next year. One of these relates to labor. Up to this time, the fear of a shortage of unskilled men, happily, has not materialized except in isolated cases. This may be explained perhaps by the fact that general industrial, new construction and other activities in the country are not on an even plane with the present unusual vigor of the steel trade. If domestic business continues to spread more broadly in all lines, this labor situation may not be so favorable for the manufacturers during the next 12 months provided the foreign demand continues at the present rate. Furthermore, since wages for common labor paid by the steel companies, notably in the Pittsburgh district, are not on a uniform basis, there naturally will be some shifting of the men towards plants where the rate is highest, if these differences in the scale are not adjusted.

The ferro-manganese situation is giving the manufacturers food for serious thought. The steel industry of the whole world is being affected by the curtailed sources of manganese ore, due to war conditions. The practical shutting-off temporarily, at least, by the British government of importation of ferro-manganese to the United States, is due primarily to this cause. Of the three leading sources of manganese ore, India, Russia and Brazil, only the latter and the least important in tonnage is producing a normal or increased supply. The large deposits of Russian Caucasus ore are completely shut-off by the blocking of the Dardanelles, while shipments from India, most of which are going to England, are only a little more than half those of 1914. Brazil, in 1914, shipped this country 113,924 tons. It probably will increase that amount this year as the tonnage has been running much heavier the past few months. Our total imports of manganese ore, the first half of the year, from all sources, were about 58,000 tons.

German sources have estimated that for a 60,000,000-ingot output, the world requires about 1,600,000 tons of 50 per cent manganese ore. If this computation be accepted, the present requirements of the United States, based on a 3,000,000-ton ingot production monthly, would represent about 900,000 tons of ore annually. In 1913, this country, according to a recent estimate from another source, consumed 775,000 tons of ore, of which 345,090 tons was imported. In that year, this country produced 229,833 tons of ferro-manganese and spiegeleisen and imported 256,217 tons of these alloys, equivalent to about 300,000 tons of 80 per cent metal, counting four tons of spiegeleisen to one of ferro-manganese. In July of this year, we were producing ferro-manganese at the rate of about 132,000 tons annually and spiegeleisen at the rate of 120,000 tons, annually, equivalent to about 162,000 tons annually of 80 per cent metal. Our imports of ferro-manganese this year to date have been not to exceed 30,000 tons and very little spiegeleisen has come in. Obviously, therefore, when the small imports are considered, we are not making anything like as large a quantity of manganese alloys as our present rate of consumption requires. The scarcity of manganese ores precludes much hope of increasing the supply, either through a larger home make or greater imports unless the Dardanelles are reopened, an uncertain event at the present outlook.

Relief of this situation may be found in greatly expanding the make of domestic spiegeleisen from manganiferous ores, but this has its difficulties. The supply of spiegeleisen to be derived from manganiferous zinc residuum, also, appears from statistics of recent years, not to be capable of much enlargement. Stocks of manganese ore or finished alloy in the country are reported as relatively light in view of the great proportions of steel output.

This cursory survey of the manganese alloy situation explains why a growing number of steel makers are seriously concerned over the problem of how to provide themselves with supplies adequate to the present scale of steel production. It illustrates that the present war which has made possible the current prosperity of the steel industry, also is demanding the solution of some questions of an extraordinary character.

The Real Question

A BRIEF filed by the government in its suit against the American Can Co., in the United States court at Baltimore last week, contains this significant paragraph in regard to the construction of the anti-trust law:

"It sets no limit to the size which a business may attain by internal expansion—by growth from within. It freely permits combinations of trade units which supplement each other—the integration of industry. It permits combinations of competitive units within limits. It prohibits, however, in any manner whatever the combining of competitive traders or trade units which together would occupy a preponderant position in any branch of trade."

The above paragraph indicates that the officials of the department of justice are slowly coming to appreciate the trend of decisions in the Supreme Court and

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other courts in regard to big business. It shows that the government no longer claims that mere size may be illegal, or that only such size as is due to combinations of competitive units is to be condemned, when by such combination a preponderant position is attained. It is well in this connection to recall what Judge Buffington said in his decision in the United States Steel Corporation suit. "The question before us," said the judge, "is not how much business was done, or how large the company that did it. The vital question is—How was the business, whether big or little, done? Was it, in the test of the Supreme Court, done by prejudicing public interests, by unduly restricting or unduly obstructing trade? The question is one of undue restriction or obstruction of trade, and not of undue volume of trade." The attorney general will find that whether a combination is the result of so-called integration of industry, or of the combination of competitive units, is not the real question. The point to be decided is whether the combination conducts its business according to right principles. The character of the integral parts has nothing to do with the question.

By-Product Versus Beehive Coke

THE lethargic condition of the beehive coke market, the only branch of the steel trade that has failed to respond to improved trade conditions has been attributed to several causes. The beehive coke industry, according to some observers in the Connellsville region, has not yet recovered from the depression that set in two years ago. Others claim that there has been no legitimate reason for an advance in coke prices until about 60 days ago, because of the backward tendency of pig iron. The business depression long since has been forgotten; pig iron prices have been advancing steadily for 40 days; prosperity seems to be enjoyed in all branches of the trade. But bee hive furnace coke still drags.

Daily production of pig iron was at the rate of 82,687 tons in July, 1915; 63,075 tons in July, 1914, and 82,525 tons in July, 1913. The average price of Connellsville furnace coke for prompt delivery was $1.67 in July, 1915; $1.75 in July, 1914, and $2.50 in July, 1913.

Despite the similarity of pig iron production figures in 1915 and 1913, the spread in coke prices for the periods named is a rather wide and surprising one. Although pig iron production two years ago last July was slightly below that for the corresponding period this year, coke commanded more in July, 1913, than in the same month this year. In July, 1914, when basic pig iron was selling at $13, valley, or $1.50 a ton below the current price, blast furnace fuel was selling at about 25 cents above the prevailing price today.

Pig iron commanded higher prices in July, 1913, than in the same month this year. Basic pig iron was quoted at $14.35, valley, 25 months ago, or about $1.50 a ton above the average price established last July. This grade has been advancing sharply the last 30 days, having sold at $14.50, valley, the latter part of August. Blast furnace coke, in the meantime, has drifted backward, having sold at lower prices in August than in July.

The present condition of the Connellsville blast furnace coke market, in a measure must be attributed to the development of the by-product coke industry. At the end of last year, there were 5,089 retort ovens in this country, with 650 under construction. Since Jan. 1, contracts for more than 1,100 additional retort ovens have been placed, the completion of which will contribute heavily to the furnace coke capacity.

Statistic of production of pig iron for August published in this issue emphasize the great activity of the steel business, due largely to war orders. Merchant stacks are coming in slowly and some that usually make foundry grades may be put on basic and bessemer soon, if the present foreign demand continues.

Iron Ore Consumption

THE United States Geological Survey, in a recent bulletin, states that the statistics of the American Iron and Steel Institute show that the production of pig iron in 1914 was 23,332,244 tons compared with 30,966,152 tons in 1913, a decrease of 24.65 per cent. The Survey says that as this decrease was less than the percent of decrease in ore production, it indicates that the ore mined, although of relatively small tonnage, was of a higher grade than the average for 1913.

The editor of the bulletin making this statement fails to appreciate several facts. He takes it for granted that all the ore mined in the two years was consumed in the manufacture of pig iron. This, of course, is not true. In the first place, all the ore mined is not always shipped. For example, in 1914, 33,540,403 tons were mined in the Lake Superior district, while only 32,729,726 tons were shipped. Of the tonnage shipped, there are no statistics to show how much was used in making pig iron and in the open hearth process and for other purposes, and how much was held in stock in blast furnace yards and elsewhere. Unless the Survey can do what nobody else has been able to do—obtain statistics as to the ore in furnace yards from year to year—it will do well not to rush to conclusions as to consumption from year to year.

Prices Present and Past

Quotations on leading products September 8, average for August, 1915, average for June, 1915, and average for September, 1914. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices Sept. 8, 1915.	Average for Aug., 1915.	Average for June, 1915.	Average for Sept., 1914.
Bessemer pig iron, Pittsburgh..	$16.90	$15.89	$14.58	$14.90
Basic pig iron, Pittsburgh.....	15.45	14.89	13.54	13.90
No. 2 Fdy. pig iron, Pittsburgh	15.45	14.70	13.45	13.90
Northern No. 2 Fdy., Chgo....	13.50	13.38	13.00	13.50
Lake Superior Charcoal, Chgo..	16.25	15.75	15.25	15.75
Mall., Bess., Chgo.....	14.00	13.38	13.00	13.50
Southern No. 2, Birmingham...	11.50	11.13	9.55	10.00
Southern Ohio No. 2, Ironton...	14.00	13.69	12.50	13.00
Basic, eastern Pa.....	17.00	15.25	13.75	14.00
No. 2X Virginia furnace.....	13.00	12.50	12.50	12.50
No. 2X foundry, Philadelphia..	16.00	15.50	14.25	14.25
Ferro mang., Balti., (prompt)..	110.00	105.00	105.00	80.00
Bessemer billets, Pbgh.....	25.00	23.00	19.87	21.00
Bess. sheet bars, Pbgh...25.00 to	26.00	24.00	20.37	22.00
Op.-h'th sh. bars, Pbgh...26.00 to	26.50	25.00	20.37	22.00
Open-hearth billets, Pbgh.....	26.00	24.00	19.87	21.00
Steel bars, Chgo.....	1.54	1.49	1.39	1.38
Steel bars, Pittsburgh.....	1.35	1.30	1.20	1.20
Iron bars, Philadelphia.....	1.45	1.30	1.20	1.20
Iron bars, Cleveland, local del'y.	1.30	1.22	1.20	1.20

	Prices Sept. 8, 1915.	Average for Aug., 1915.	Average for June, 1915.	Average for Sept., 1914.
Iron bars, Chgo. mill.....	$1.25	$1.23	$1.15	$1.07
Beams, Chicago	1.54	1.49	1.39	1.38
Beams, Pittsburgh	1.35	1.30	1.20	1.20
Beams, Philadelphia	1.509	1.409	1.359	1.30
Tank plates, Pittsburgh.....	1.30	1.30	1.15	1.185
Tank plates, Chicago.....	1.49	1.44	1.31	1.38
Tank plates, Philadelphia.....	1.509	1.409	1.359	1.30
Sheets, blk., No. 28, Pbgh.....	1.90	1.83	1.80	1.95
Sheets, blue an., No. 10, Pbgh.	1.50	1.36	1.35	1.40
Sh., galv., No. 28, Pbgh., nom.	3.75	3.93	4.46	2.95
Wire nails, Pittsburgh.....	1.65	1.61	1.55	1.55
Connellsville fur. coke contr...	1.75	1.75	1.65	1.75
Connellsville fdy. coke, contr...	2.35	2.25	2.25	2.35
Heavy melting steel, Pbgh.....	14.50	13.38	11.75	11.44
Heavy melting steel, east'n Pa.	15.00	13.75	11.25	10.75
Heavy melting steel, Chgo.....	12.00	11.50	9.37	9.37
No. 1 wrought eastern Pa.....	16.00	15.25	13.00	12.50
No. 1 wrought, Chgo.....	10.75	10.12	8.75	8.31
Rerolling rails, Chgo.....	13.00	11.75	10.00	10.87
Car wheels, Chgo.....	11.75	11.38	9.87	10.75

(For Additional Prices See Page 504.)

Pig Iron Sellers Adhere to Prices

And a Very Fair Volume of Business is Being Transacted —Southern Iron is Not Advancing

New York, Sept 4.—A sellers' market in pig iron with makers holding firmly for advancing prices both for this year and for first quarter and first half is manifest in all directions. Some producers still are indifferent as to selling for next year and in not a few cases in eastern Pennsylvania, schedules for that period remain unfixed. Buyers are alive to the situation and the inquiry is good. The Buffalo market has been strengthened by the purchase of the output of hot basic metal of one of the Susquehanna furnaces for the rest of the year, estimated at 40,000 tons or more by the Lackawanna Steel Co. This steel company has all its furnaces in blast and needs more metal for its steel works. Some makers at Buffalo now ask $16, furnace, for No. 2X for this year and require all business for early or future shipment to be submitted. Other producers retain $15 for No. 2X for first quarter. There has been a fair selling of Pennsylvania grade for first quarter and first half at $17 to $17.50, tidewater, for No. 2X. One eastern Pennsylvania maker sold for next year at $16.50, furnace, for No. 2X or $17.25, tidewater basis. Some central Pennsylvania iron for next year has been selling at $15, furnace, or over $17, tidewater. Certain makers in that district ask $16, furnace, for No. 2X. A New Jersey pipe maker bought 3,000 tons of first quarter forge at $16.25 and is negotiating for 5,000 tons more. At $15, Buffalo, the price at certain Jersey tidewater points is $16.84, and at others, $17.10. For this year, the tidewater spread is $15.75 to $16.25, for No. 2X. A Flemington, N. J., shop asks 1,000 tons of No. 2 plain for first half. The 11,500-ton inquiry of the International Steam Pump Co. remains open. A New England machinery builder wants 2,000 tons of prompt foundry. A lot of more than 1,000 tons of low phosphorus for next year was placed in this territory. The export market for bessemer is about $18.50 to $19, tidewater. An interesting development is the quoting of rates by some steamship companies in dollars and cents instead of pounds and shillings. Italy took 2,000 tons more of bessemer in the week and a new inquiry for 3,500 tons for that destination has been put out by a New York house. Both France and Italy figure on further lots of low phosphorus.

Expect Activity

Buffalo, Sept. 7.—In the face of the sold-up condition of two of the three leading furnace interests of the Buffalo district over the remainder of the year, a decided increase in the demand for foundry grades and malleable iron is expected from the melters engaged in the making of railroad supplies and accessories, when the large trunk lines finally come into the market with long-deferred equipment and material purchases. The disappearance of surplus idle cars reported in advance of the demand on the railroads occasioned by the movement of the great crop of this year, is taken as an indication pointing to the coming activity in many large foundries throughout the territory that have been marking time for a considerable period. It is predicted in a number of quarters that forced railroad buying will occasion as great an activity among the ironmakers as is now noted among the steelmakers.

The sales for the week, outside of the hot metal to the Lackawanna Steel Co., amount to about 10,000 tons. Only a single selling interest is in the market for orders for delivery over the remainder of the year. Stop sales prices of $16 to $17 are being quoted by the other producers. The active seller is quoting from $15 to $15.50 for deliveries over the rest of the year and into first half, ir-

(*For complete prices see page* 504.)

respective of grade differentials. Basic is at the present up to $15.75 to $16.25.

The delivery of hot metal to the Lackawanna Steel Co. began this morning.

Prices Continue Upward

Pittsburgh, Sept. 7.—Market prices of all pig iron grades continue their march toward higher levels in the Pittsburgh district. Bessemer iron is being held at $16, valley, and basic iron is being quoted at $15, valley, or about 50 cents a ton above prevailing prices for these grades a week ago. Scattering lots of bessemer iron have been sold by valley interests at $16, furnace, for prompt delivery and Italian interests have paid that figure for additional iron this week. Quiet inquiry for both grades involves rather heavy tonnages. No. 2 foundry and malleable irons have sold at as high as $15 for future delivery.

Interest in the price of ore for 1916 delivery is manifested by blast furnace officials in the Greater Pittsburgh district. It generally is believed that the 1916 price schedule will be about 50 cents a ton above that established for the present season. Sales of ore to eastern interests for prompt delivery involve heavy tonnages in the aggregate.

Quiet at Cincinnati

Cincinnati, Sept. 6.—The pig iron market is very quiet. The majority of melters in this territory have covered for the last half, and are refusing to pay first half quotations. Furnaces are not making strenuous efforts to secure business, as their order books are, in most cases, full for delivery up until the first of the year. Inquiry has fallen off to almost nothing, and is limited to a few small lots. The majority of furnaces in the south are holding firmly at $11.50, Birmingham basis, for No. 2 foundry, for the last quarter, and at $12.50, Birmingham, for the first half of next year, but one and probably two stacks will sell limited lots for prompt delivery at $11, Birmingham basis. A small amount of resale iron is reported to have changed hands during the past few days at $11 and $11.50, Birmingham basis, for No. 2 foundry. Virginia iron in this markket has advanced to $14, furnace, for No. 2X, for the last quarter, and $14.50, furnace, for the first half of next year. Southern Ohio silvery iron is now quoted by one stack at from $17 to $17.50, furnace, for 8 per cent silicon. Southern Ohio No. 2 foundry is being held at $14, Ironton basis, for the last quarter, and at $14 to $14.50, Ironton basis, for the first half of next year. The International Steam Pump Co. has closed with various stacks for 7,000 tons of foundry iron, part of which will be shipped to its local plant.

Canton Company Buys

Cleveland, Sept. 7. — The United Steel Co., Canton, has bought 10,000 tons of basic for November and December delivery at $15.30, delivered. This company was in the market about a month ago and is understood to have purchased a round tonnage at that time, but details are lacking. Sales continue at an active rate and prices are firm. Shipments against contracts are going forward very satisfactorily.

Malleable is Higher

Chicago, Sept. 7.—Principal interest in the Chicago pig iron market attaches to the position of malleable grades, which have advanced more rapidly than foundry. At present, northern malleable is not obtainable under $14, Chicago furnace, and any excess of silicon beyond the standard analysis brings a premium. This higher position of malleable over foundry is due to lack of competition in that sort of iron and to the greater demand, practically all inquiry at present for iron to be delivered before Jan. 1 being for malleable.

Foundry iron still is obtainable at $13.50, Chicago furnace, for immediate delivery, and open quotations of $13.75, Chicago furnace, for first quarter, and $14.25 for second quarter, are being made, while iron to be taken in equal monthly shipments over first half is quoted at $14, Chicago furnace.

Southern iron is being quoted by most sellers at $11.50, Birmingham, for the remainder of the present year and considerable iron is contracted for next year's delivery. Sales have been made recently on a basis of $12.50, Birmingham, for first half delivery.

Prices Tend Upward

St. Louis, Sept. 6.—The tone of the pig iron market is decidedly improved in this territory, with prices on the upturn. Inquiries are out for 1,000 tons of Lake Superior iron for car wheel purposes, 700 to 800 tons of southern No. 2, and a fair tonnage for small orders.

Some furnaces have withdrawn from the market, while others are quoting southern No. 2 at $12.50, Birmingham. One offer of $11.50 for southern No. 2, Birmingham basis, for 150 tons for delivery within the present year, was promptly declined Friday. Southern iron is hard to get.

Northern iron is stiff at $14, Chicago, and Ironton, for this year's delivery, and at $14.50, Ironton, for first half delivery.

(*For complete prices see page* 504.)

Satisfactory Sales

Birmingham, Ala., Sept. 6.—With a fair inquiry in the pig iron market and operators selling at about their make, prices have apparently settled at $11.50 for No. 2 foundry for the remainder of the year and $12.50 for the first quarter of the new year.

Sales during August were not as large as the previous month, but were very satisfactory to furnace operators in the Birmingham district, as far as can be learned. Several sales for average size lots were closed during the week at $12.50 for 1916 delivery. Sales for August, it is understood, fell slightly under the production of the district, the latter for the month being placed at between 250,000 and 260,000 tons.

Wire Wanted

In Very Large Tonnages by France, England and Russia

Pittsburgh, Sept. 7.—Inquiries for barb wire for shipment to France, Great Britain, Russia and Italy involve tremendous tonnages, exceeding 125,000 tons, according to some estimates. South American and far eastern countries are negotiating for barb and plain wire and nails. Domestic demand shows moderate improvement, although nails continue to drag in most sections of the country. Mills are operating at maximum theoretical capacity and deliveries are deferred from one to three months. The 70-cent extra for galvanizing is being maintained in this district, although not much galvanized material is being sold.

Prices Held

Buffalo, Sept. 7.—The recently advanced prices are being held firmly by the selling interests in the Buffalo territory. Specifications continue to come in in good volume. Most of the users are under contract so that inquiry is more or less light. Producers are practically out of the market over the remainder of the year in the wire lines with the exception of nails. There is no improvement in the deliveries.

The Bayonne Steel Casting Co., Bayonne, N. J., which recently purchased a tract of land 130 x 614 feet on Oak street, Bayonne, advises that it does not propose to use the land for the erection of new buildings. The transaction was merely an exchange with a view of squaring the company's present plot.

Steel Bars for Next Year

Interest Extends to Delivery After Jan. 1, Especially on Large Rounds for Making Shrapnel

New York, Sept. 7.—Negotiations for large rounds for shell manufacture which are heavy, now relate chiefly to delivery after Jan. 1. Some business for that period has been closed. Certain large makers stand by a 3-cent mill price for that period, but other makers are accepting less. Some premium prices are being obtained for this year's delivery, owing to the fact that there is not much free tonnage to be had. A lot of 5,000 to 10,000 tons brought between 2.75 and 3 cents mill. A report that the Eastern Steel Co., Pottsville, Pa., has taken 16,000 tons of shrapnel rounds is denied officially. This company is not taking any shell steel but is confining its business to its regular line of structural shapes, upon which it is well booked. Buyers of bars, outside the war trade, are showing more interest in their requirements after Jan. 1, as they realize it would be wise for them to get in their tonnage early in view of the prospect that the present congestion of the mills will be extended to that period. While it is not believed any of the makers have made any general quotations for first quarter or half, 1.40c, Pittsburgh, has been indicated by some producers. Some further lots of smaller sizes of bars have been sold to the British Isles the past week on which makers quoted in dollars and cents because of the erratic exchange condition.

New Inquiry Heavy

Philadelphia, Sept. 7.—New inquiries for 20,000 to 25,000 tons of large bars or billets for shell manufacture, largely according to British specifications, has appeared from plants in this territory. One buyer asks 14,500 tons made up of 6,000 tons of 6½-inch rounds or 7½-inch squares, 6,000 tons of 9¾-inch squares and 2,500 tons of 4¾-inch rounds. Another wants 4,000 to 6,000 tons of 3 7/16-inch rounds. From Baltimore, 2,000 tons of 3¼-inch either open hearth or bessemer is asked. Numerous other lots are out. Considerable range still is shown in the price of shell rounds. One large maker here recently sold at 3.25c, mill, but other mills have accepted below 2.50c, mill, recently. Specifications against steel bar contracts from the purely domestic trade in this territory are active. It is significant that cancellations of unspecified quotas at the end of August were very light. Mill deliveries run 10 to 12 weeks. Current prices are strong at 1.35c, Pittsburgh, or 1.509c, Philadelphia, with little selling. One large maker sold over 10,000 tons of ordinary bars to one customer to be shipped as able at 1.40c, Pittsburgh. No quotations for first quarter are being made.

Question of Delivery

Buffalo, Sept. 7.—Deliveries rather than prices are the principal features of the inquiries coming into the mills and agencies of the Buffalo district. All of the selling interests are holding firm at 1.35c for last quarter where able to make deliveries and not disposed to book business into 1916. The pressure on the mills for material under contract continues and premium offers to force deliveries are being turned down by the steelmakers whose tonnages are going to contract customers who have specified sufficiently far enough in advance to get out their material at a time approximating the period when needed. Deliveries vary from five to eight weeks on smaller sizes; six to eight weeks on larger sizes and rounds and squares over 2 inches have no definite delivery dates promised by the majority of the producers.

War Material Defers Shipments

Pittsburgh, Sept. 7.—Heavy buying of shrapnel steel continues to feature the market in the Greater Pittsburgh district. Bar and rolling mills are engaged producing rounds of large diameter for shrapnel shells and most mills are unable to promise additional material this year. Representatives of Great Britain and France, who tentatively inquired for rounds and billets last month, have returned to Pittsburgh, after visiting other steel centers, in an attempt to obtain tonnages for nearby shipment. Although they are offering attractive prices, yet most of their inquiries are going begging. Specifications from domestic consumers, including agricultural implement makers, nut, bolt and rivet manufacturers and shafting interests, are increasing in volume. Deliveries of rounds for domestic consumption are deferred from 60 to 90 days. Iron bars are being quoted at 1.40c by most mills in this district.

In Market for 33,000 Tons

Cleveland, Sept. 7.—The Hydraulic Pressed Steel Co., Cleveland, has taken a contract to manufacture 2,500,000 steel casings for shrapnel shells for Russia and it is probable that the company will also take the contract for an additional 2,500,000 casings. The 5,000,000 casings would require 33,000 tons of steel and the company is in the market for that tonnage. Steel companies are not anxious to bid, as their order books are in good condition. One company bid 3 cents, and others declined to bid. It is understood that the Baldwin Locomotive Works, Philadelphia, which is letting the casings by sub-contracting to the Cleveland company, has an option on a large tonnage of steel rounds, but that the Cleveland company, if it can buy at a lower figure, will be given the advantage of placing the order. Delivery of the casings is to begin with 5,000 in September, 20,000 in October, 100,000 in November, 200,000 in December. The deliveries are then to be at the rate of 250,000 per month, until one half are delivered, after which 500,000 per month are to be delivered. The Hydraulic Pressed Steel Co. has completed an addition 640 feet in length and will build another addition 280 feet long. It is now working three shifts of eight hours each.

Delivery Only Consideration

Chicago, Sept. 7.—The only uncertainty in the steel bar market is that of delivery. Tremendous tonnage of orders is offered all steel makers and the only question is how many can be accepted and deliveries made sufficiently early to satisfy buyers. Several times as much tonnage in bars and other finished steel products are being inquired for as can be rolled during the remainder of the year and much of this necessarily is declined. No question exists as to the stability of the present quotation of 1.54c, Chicago mill, but nothing indicates that steel makers will advance this price, as they feel further increase would not be wise.

Hard steel bars rerolled from rails are firm at 1.30c to 1.35c, Chicago mills, with demand excellent.

Bar Iron More Active

Chicago, Sept. 7.—Considerably better conditions exist in the market for bar iron. One interest has been able to operate its mill practically full for the past month and other concerns have improved their schedules materially. The price remains consistently firm at 1.25c, Chicago mill, without evidence of shading. Specifications are being sent in by consumers in much larger volume. The greater part of the iron being specified was closed before the recent

(*For complete prices see page* 504.)

increase from 1.20c to 1.25c, Chicago. Indications are for considerably increased demand in the near future and capacity may be well filled within a few weeks.

Hoops, Bands and Shafting

Pittsburgh, Sept. 7.—Steel bands have been established at 1.35c, or $1 a ton above the prevailing market minimum ten days ago. Hoops are firm at 1.40c. Specifications for both products show considerable snap, but new buying is rather light since consumers covered requirements some time ago. Demand for cold rolled steel shafting continues heavy and manufacturers are operating plants at maximum capacity in an effort to fill orders. Deliveries are deferred from 60 to 90 days.

Buying of Steel Rails

Promises to be in Full Swing at an Early Date—Pennsylvania is Making Estimates of Its 1916 Requirements

New York, Sept. 7.—Realization by railroad managers that with the present congestion in steel they must make provision in time to assure themselves of deliveries upon their requirements, now is causing them to act more swiftly in arranging for future mill positions. This is especially apparent in steel rails for which negotiations for 1916 shipment already are being advanced by leading systems. The Santa Fe has closed with the Illinois Steel Co. for a tonnage of rails to be shipped next year. The Pennsylvania railroad has begun the making up of estimates of its 1916 requirements while the New York Central and other systems are giving this matter consideration. It is believed in rail circles that a considerable buying movement for next year will be under way by Oct. 1, which will be much earlier than has been the case during the past few years.

The railroads continue to meet with difficulty in obtaining desired shipments on odd lots of rails for this year. The Baltimore & Ohio is in the market for 2,000 tons additional for early delivery and it finds some mills unable to accommodate it. The Cambria Steel Co. just has completed the rolling of 13,000 tons of rails for that road. The Southern railroad is in the market for 5,000 tons for early shipment, which probably will go to Pittsburgh or Chicago mills.

Considerable miscellaneous buying of cars and car parts is being done, but no large lots are being closed. Though the prospects are better, immediate conditions are slow. The Santa Fe has taken 500 stock and 25 ore cars from the Pullman Co. and 25 ore cars from the Western Steel Car & Foundry Co. The Nashville, Chattanooga & St. Louis placed 200 box cars with the American Car & Foundry Co. The Bangor & Aroostook bought 100 flats, reported to have gone to the Standard Steel Car Co. The Illinois Steel Co. took ten tank cars from the American Car & Foundry Co. The Virginia-Carolina Chemical Co., which asked for 120 box cars, bought that number of steel underframes instead. The Main Central closed for 1,100 center constructions with the Standard Steel Car Co. The Western Maryland is understood to have 1,000 hopper cars in prospect, but has issued no formal inquiry. The Norfolk & Western is building 500 coal cars in its own shops, for which the Virginia Bridge & Iron Co. will build the superstructures. The 1,000 steel auto cars for the New York Central lines still are pending. In light cars, the Wyoming Coal Co. took 50 of the mine type from the Pressed Steel Car Co. The H. C. Frick Coke Co. has closed against a recent inquiry for 400 mine cars and the United States Coal & Coke Co. for 50 mine cars.

In locomotives, the Servian governmentment has ordered 15 Prairie type, weighing 143,000 pounds each, from the American Locomotive Co. The American Railroad Co. of Porto Rico placed three of the consolidation type, weighing 83,000 pounds each, with the same builder.

Sheets Higher

Makers of Black and Galvanized Advance Quotations

Pittsburgh, Sept. 7.—The advancing market tendency of spelter the last fortnight has reduced somewhat the production of galvanized sheets, mill managers not wanting to accumulate surplus tonnages until the spelter situation clarifies. No. 28 gage galvanized sheets are selling at a range from 3.75c to 4c; No. 10 blue annealed are being held at 1.50c and No. 10 black sheets are firm at 1.90c. Open hearth steel sheets are commanding premiums of about $1 a ton. Demand for shipment to South American and far eastern countries is heavy, and some material continues to be shipped to belligerent European nations. Sheet mills are operating at about 75 per cent of capacity and are not relatively so busy as other finishing mills.

(*For complete prices see page* 504.)

Sheets Are Higher

Chicago, Sept. 7.—Makers of black sheets in this territory have advanced prices to 2.04c, Chicago, on steady and increasing demand. Galvanized sheets may still be obtained at a wide range, depending on the cost of spelter in the hands of makers. They may be quoted from 3.69c to 3.94c, Chicago, and transactions at any point between these prices have been made recently.

An independent sheet maker in this market has canvassed the situation recently and has come to the conclusion that galvanized sheets may be made with spelter at 11c and consumers be able to use the material profitably. On this basis no profit is made on the galvanizing process, but it serves to dispose of a further tonnage of black sheets.

Sheets Firmer

Cincinnati, Sept. 7.—The galvanized sheet market is firming up slightly, because of the uncertainty of the price of spelter. Sales are being hindered by the refusal of mills to sell for extended delivery on either black or galvanized grades. Some rolling mills in this territory are not running at full capacities on their regular products, but are using a portion of their facilities for the indirect manufacture of war munitions. The demand for sheet bars from eastern mills is good. Black sheets No. 28 gage are quoted at from 1.85c to 1.90c, and galvanized sheets No. 28 gage at from 3.65c to 3.75c, both Pittsburgh basis.

Tin Plate Improves

Pittsburgh, Sept. 7.—Specifications for tin plate last week were heavier than those received during any similar period for a couple of months, according to several manufacturers. Export departments are filling orders for shipment to the Orient and to South America. Material continues to be offered at as low as 3.10c.

The officers, members of the sales force and heads of departments of the J. M. & L. A. Osborn Co., Cleveland, dealers in tin plate, sheet iron, copper and zinc, have organized the Harmony Club for the purpose of discussing promotion plans for the sale of galvanized sheets, tin plate, copper, eaves trough, conductor pipe and rolled roofing. On Thursday, Aug. 26, the employes of the Osborn company attended an outing at the Cleveland Yacht Club.

Billet Sales

Said to Include 50,000 Tons for Shipment to the Allies

Pittsburgh, Sept. 7.—The scarcity of billets and sheet bars appears more acute, and prices continue to advance rather sharply. Billets are being held at $25, Youngstown, and doubt is expressed if material could be obtained at Pittsburgh for $26. The market for sheet bars, so far as new sales are concerned, is quiet and it is difficult to obtain an accurate line on the situation. Forging billets are being held at as high as $35, Pittsburgh, but no actual sales at that figure are reported. Wire rods are scarce; they are being quoted at $30, Pittsburgh, by some mills.

Canadian Competition

Philadelphia, Sept. 7.—Canadian semi-finished steel has appeared in competition with domestic makers in this territory and various sizes of billets and blooms are being offered. The prices still are indefinite, as no sales have been learned. Some middle western works also seem to be offering billets in larger quantities in this market. This development is said to have arisen from cancellations of orders for export by buyers who stood to lose a considerable amount because of the slump in foreign exchange. There is talk of some of this steel having been resold down to $23, Pittsburgh, or $25.54, Philadelphia. Ohio makers have offered billets at $25, mill, or about $28, Philadelphia. Eastern makers are in no shape to take on any tonnages and they still quote $30 to $32, Philadelphia, on re-rolling and $34 to $38, mill, on forging. In addition to the inquiries for billets from shell makers referred to elsewhere, considerable inquiry is coming out. One buyer has renewed an inquiry for 3,000 tons of sheet bars, first quarter. Scotch buyers have asked sellers here for 1,000 tons of sheet bars, 500 tons of ordinary blooms, 500 tons of nickel blooms, 500 tons of wire rods, 500 tons of tube strips and some other lots. An eastern Pennsylvania maker sold 7,000 tons of forging blooms for shipment to France at full domestic prices.

Benzol Plant Now Active

Operations of the new benzol plant of the Carnegie Steel Co. at Farrell, Pa., which were instituted several weeks ago, now are proceeding very satisfactorily. The rate of output of benzol and its by-products has reached expectations and the quality of the product has more than attained the required standard. This is the first benzol unit of the Steel Corporation to be started. Similar plants are under construction at Gary and Ensley, which, when completed, will give a combined output of many millions of gallons of benzol annually.

Coke Market

Is Gaining Slowly and Slightly Better Prices Prevail

Pittsburgh, Sept. 7.—Despite inactivity, Connellsville furnace coke for prompt shipment continues to gain ground slowly. Dealers obtained from $1.65 to $1.75, ovens, last week for 48-hour fuel for immediate shipment and some cokemakers are asking $1.80 for nearby delivery. The contract market remains inactive; dealers are asking $2, ovens, for this year's shipment and $2.50, ovens, for delivery over the first half of next year. Foundry coke reflects improvement. Specifications are brisk and new orders involve heavy tonnages in the aggregate. The *Connellsville Courier* for the week ending Aug. 28 says production was 391,310 tons, an increase of approximately 10,000 tons over the week before.

Foundry Higher

Cleveland, Sept. 7.—Rainey foundry coke is now being sold at $2.75 on contract and some other sellers are not quoting at the present time. The usual quotation on high grade foundry coke for prompt delivery is $2.40.

Coke Stationary

Cincinnati, Sept. 7.—Despite reports of higher quotations from the Connellsville district, southern coke prices are stationary, but strong. No transactions in either 72 or 48-hour grades are reported for the past week. Two southern Ohio stacks are making tentative inquiries for fuel for the first half of next year, but are not willing to buy at present quotations. Producers in the Wise county, Pocahontas and New River districts are keeping only a sufficient number of ovens in blast to supply contracts. Shipments on both furnace and foundry grades on old orders are satisfactory.

Dull at St. Louis

St. Louis, Sept. 6.—Coke is rather dull, but prices are firm. A local concern is asking for 800 tons of foundry grades for immediate delivery. Standard brands of Connellsville foundry coke are held at $2.75.

(*For complete prices see page* 504.)

Plate Makers

Are Conservative in Regard to Quoting for Next Year's Delivery

Philadelphia, Sept. 7.—On contract inquiries for next year, eastern Pennsylvania plate makers have declined to quote at present. They also continue to follow the policy of discouraging any contracting for fourth quarter, but where the buyer is insistent 1.45c, Pittsburgh, and in cases 1.50c, Pittsburgh, still are being named. For current orders 1.40c, Pittsburgh, or 1.559c, Philadelphia is more commonly asked and obtained. The market is strong and the demand remains heavy. Some eastern mills have a large backlog for eight to ten weeks ahead, but can make some shipments in four to six weeks. Shipbuilding orders and prospects continue excellent.

Two Boats Awarded

New York, Sept. 7.—Contracts for two 9,000-ton merchant vessels have been awarded to the Newport News Shipbuilding & Dry Dock Co. by the Crowell & Thurlow Steamship Co. These boats are for delivery after a little more than a year. The delivery period illustrates the very large volume of new work that is being maintained on the books of eastern shipbuilders, as practically none of the yards are able to accept work other than for delivery late in 1916. A number of vessels are in the market awaiting a place on the berths. The steel for the two boats just placed, 8,000 to 10,000 tons, will be furnished by Pittsburgh and eastern Pennsylvania mills. Plate prices are firm at 1.469c, New York, or 1.35c, Pittsburgh, for current delivery.

Plate Buying Lighter

Pittsburgh, Sept. 7.—Specifications against contracts for steel plates gradually are increasing in volume, much to the satisfaction of mill managers. More important producers are quoting plates at 1.35c and considerable tonnage has been sold at that figure. New buying, however, is not so heavy as it was during early summer, but indications are that the market will broaden before Oct. 1.

Plates Are Stronger

Chicago, Sept. 7.—Demand for steel plates is increasing and quotations by some makers are firm at 1.54c, Chicago, while mills rolling only a partial line of sizes are willing to take tonnage at $1 per ton less.

The annual meeting of the National Machine Tool Builders' Association will be held at the Hotel Astor, New York, Oct. 28 and 29.

Scrap Advances

As Consumers Show More Interest in the Market

Pittsburgh, Sept. 7. — Consumers of iron and steel scrap in western Pennsylvania again are figuring in the market, and rather sharp advances have been recorded this week. Heavy melting steel is being held at $15 a ton by most dealers and some tonnages have sold at as high as $15.25. Whether the $15 figure could be shaded, seriously is doubted by several middlemen. Low phosphorus steel scrap is selling at as high as $18 a ton.

Rising Prices

New York, Sept. 4.—Rising prices still are shown in some grades of old material by sales made through dealers here. In heavy melting steel, $15, delivered eastern Pennsylvania, was obtained on 1,000 tons, which the seller had in hand. Carloads of wrought pipe have been sold at $14.50, delivered eastern Pennsylvania, and there are unconfirmed rumors of $15 having been paid. No. 1 heavy cast at New Jersey points is slightly higher, with $12.50, delivered, obtained in some cases. Eastern Pennsylvania buyers are offering $18.50, delivered, on steel axles, but Italy will pay a higher equivalent in this market. A good export inquiry continues with Italy the chief buyer, principally of rerolling steel stock. In general material, still is offered lightly by the yards to middlemen and is coming out mostly in carloads.

More Lines Advance

Buffalo, Sept. 7.—Advances in price, following increased activity in No. 1 railroad wrought and railroad machinery cast scrap, railroad malleable, old iron rails and old car wheels have appeared in the old material market, the principal advance being in old iron rails, going to $15.50 to $16. Heavy melting steel continues firm at $13 to $13.50, with quite a volume of trading in this and the other lines. It is estimated that the price level reaches this week will remain steady for a time at least.

Still Upward

Philadelphia, Sept. 7.—Heavy melting steel continues its upward movement and most of the other grades of old material follow a similar course under an active demand in this district. For heavy melting steel $15, delivered, now is being paid freely by some buyers and this seems the market minimum. There is talk among dealers of $15.50, delivered, for steel, but no sales at that figure have been established. For wrought pipe, dealers have been offering $14.25, delivered eastern Pennsylvania, without takers. Material generally is being offered only sparingly. Low phosphorus especially remains scarce and $20, delivered, is reported to have been paid. Italy has out a new inquiry for 3,000 to 4,000 tons of heavy melting steel and 2,500 to 4,000 tons of ingot crops.

Iron Scrap Weaker

Cincinnati, Sept. 7.—The iron and steel scrap market has lost a little of the strength that has characterized it for the past two months. Prices are unchanged, and while a decline will probably not occur unless the market develops an unlooked-for weakness, another advance is not likely to be realized for some time. Demand on steel-making iron is low, as rolling mills bought heavily last month, and now have sufficient quantities to run them well into the first half of next year. Jobbing foundries are buying from hand to mouth, and stove foundries are taking only occasional small lots that have no influence upon the character of the market.

Quiet at Chicago

Chicago, Sept. 7.—Comparatively little trading is being done in iron and steel scrap in the Chicago district, mills apparently having sufficient supply for present needs. Brokers with obligations for delivery are dealing to obtain their requirements but the market as a whole is comparatively soft. Some changes in quotations have been made recently to align various products more closely to existing conditions, but prices are largely nominal and somewhat sentimental.

Railroads are offering only fair tonnages, which are not affecting the market. The B. & O. has the largest list now current, with 12,300 tons, including 2,400 tons of pressed steel in the form of steel underframes, 2,000 tons of steel rails and 700 tons of No. 1 wrought. The C., St. P., M. & O. offers 540 tons, the Mobile & Ohio 700 tons, the Soo Line 150 tons, C., M. & St. P. 2,000 tons, the Southern railway 2,000 tons and the Kansas City Southern 150 tons.

Little Easier

St. Louis, Sept. 4.—There has been a slight tendency toward an easing off in the scrap market, though prices are about the same as reported last week on all grades. Railroad offerings last week commanded a premium over sales prices to consumers, a spread which represented the feature of the market.

Railroad offerings this week are as follows: Southern, 2,875 tons; Kansas City Southern, 170 tons; Wabash, 900 tons; Missouri Pacific, 1,100 tons; St. Louis and San Francisco, 200 tons; Baltimore & Ohio, 12,000 tons, and an open list from the New York Central.

Market Dull

Cleveland, Sept. 8.—The iron and steel scrap market at Cleveland is dull for the most part and prices unchanged, with the market showing no particular weak spots. Leading local consumers of heavy melting steel are deferring shipments of that material wherever possible and rolling mills are not doing much buying. The embargo put on the Monessen, Pa., plant of the Pittsburgh Steel Co., Sept. 3, has extended an unsettling effect upon some proposed shipments from this territory. In fact, a lull is being experienced in this market, but it is believed to be only temporary.

(*For complete prices see page* 504.)

Bolts and Nuts

Are Advanced Owing to Higher Cost of Plain Material

Cleveland, Sept. 7.—Owing to the increased cost of materials and the active demand, small bolts and nuts have been advanced 5 per cent and discounts on nuts have also been lowered. Quotations are now as follows, delivered within a 20-cent freight radius: Carriage bolts, ⅜ x 6 inches, smaller or shorter, rolled threads, 75, 10 and 10; cut threads, 75, 10 and 5; larger or longer, 75 and 5. Machine bolts with hot pressed nuts, ⅜ x 4 inches, smaller or shorter, rolled, 75, 10, 10 and 5; cut, 75, 10 and 10; larger or longer, 75 and 10. Gimlet and cone point lag or coach screws, 80 and 15. Hot pressed square, blank or tapped nuts, $5.80 off list; hot pressed hexagon blank or tapped, $6.30. Cold pressed square, blank or tapped, $5.30 off; hexagon, blank or tapped, ½-inch and larger, $6.75; 9/16-inch and smaller, $7.25.

Heavy Specifying

Pittsburgh, Sept. 7.—Specifications for nuts, bolts and rivets are coming out in good volume and most plants have enough orders on their books to keep them busy the remainder of the year. Exports involve considerable tonnage in the aggregate.

The Port Henry (N. Y.) blast furnace of the Northern Iron Co., has resumed operations after having been idle for a number of months.

Ferro Prices

As High as $125 on Some Sales—Uncertainty as to Supply

New York, Sept. 7.—Appreciation of the serious condition that is arising in ferro-manganese and of the possible effect on future operations, continues to grow among consumers. While there is no immediate pinch except perhaps in the case of some of the smaller users, the stocks in the hands of some of the steel companies are approaching or getting below the stage that is regarded as an unsafe provision under present operating conditions. Some steel companies in the east are understood to have only about two months' supply on hand. Difficulties of getting metal are increasing. Further shipments in the near future from England still are an uncertain quantity, and domestic makers either have not much tonnage to offer or are disinclined to sell. Prompt domestic ferro-manganese has sold at $125 at the furnace. Sales of two carloads at this price are noted.

The stringent position of the market and the uncertainty of the future outlook are reflected by the announcement of a new schedule for domestic manganese ore by the Carnegie Steel Co., representing an advance of 19 cents per unit. This company now is offering 45 cents, Pittsburgh, per unit, for 49 per cent ore, 43 cents for 46 to 49 per cent; 40 cents for 43 to 46 per cent and 36 cents for 40 to 43 per cent. It is thought that this probably is the highest price this leading buyer ever has offered for domestic ore. The effect of this sharp advance will likely be renewed effort to discover and operate new domestic sources of this mineral. Not much hope is held out, however, that the home supply can be increased largely. The tendency among sellers of foreign manganese ores, as a result of the Carnegie Steel Co.'s announcement, is to advance their prices.

An expected advance in the domestic spiegeleisen market has been established. Prices on the lower grades are up $2 a ton, which is equivalent to $28, furnace, for standard 20 per cent. The tonnage of this alloy available for early delivery is limited, because of the recent heavy transactions previously referred to.

One English maker has indicated in advices of the past few days that it now is willing to entertain business at $100, seaboard, for first half subject to its ability to make shipments. This is taken to indicate that this maker anticipates it will be able to carry out contracts for some tonnage for that extended period, since it now is arranging to resume deliveries in October against this year's obligations.

Domestic Ore Sells High

Philadelphia, Sept. 7.—Trial cargo lots of domestic manganese ore, analyzing 40 to 45 per cent manganese have been sold to eastern buyers at 38 cents per unit, delivered. This transaction was closed before the radical advance of the Carnegie Steel Co.'s schedule for domestic manganese ore was announced to the market.

Steel-Making Metals Scarce

Pittsburgh, Sept. 7.—The more important consumers of domestic ore for the manufacture of ferro-manganese are offering attractive prices for prompt delivery, some of them being willing to pay 50 per cent above normal market quotations. The offering of premiums indicates that producers fear that future shipments of foreign ore will be uncertain until after the war has ended.

The scarcity of steel-making metals gradually is growing more acute. Dealers are unable to offer additional material and shipments are considerably deferred.

Advanced prices for ferro-silicon announced a week ago are being maintained on the basis of $22, furnace, for 12 to 13 per cent. A Dayton, O., interest has taken 2,000 tons of 14 per cent material for shipment to July 1, next, paying $24.50 for this year's delivery and $25, furnace, for shipment the first half of next year.

The following prices prevail for ferro-alloys and steel-making metals:

Ferro-manganese, $100 to $110 a ton at the eastern seaboard. Spiegeleisen, $26 to $28 a ton, at the furnace. Ferro-silicon, 50 per cent, $75 a ton for carloads and $73 a ton for more than carloads, at Pittsburgh. Bessemer ferro-silicon, 9 per cent to 10 per cent, $19; 10 to 11 per cent, $20; 11 to 12 per cent, $21; 12 to 13 per cent, $22 a ton at the furnace at Ashland, Jackson and New Straitsville, Ohio.

Ferro-chrome, 4 to 6 per cent carbon, 20 cents per pound; 2 per cent carbon, 40 cents per pound, delivered. Ferro-vanadium, $2.25 to $2.30 per pound of contained alloy, Pittsburgh. Ferro-carbon titanium, 8 to 12½ cents per pound in carloads. Nickel, 52 cents per pound. Ferro-tungsten, nominal, at $3 to $3.50 per pound of contained alloy. Cobalt metal, $1.60 to $1.75 per pound, Pittsburgh.

Aluminum is quoted at 46 cents per pound, New York. Ferro-molybdenum, Pittsburgh, nominal.

(*For complete prices see page* 504.)

Demand for Shapes

Shows Moderate Improvement—Low Fabricating Bids

New York, Sept. 7.—Not a great deal of progress is being made by the structural steel market in this district in the volume of new tonnage from building operations. The total of work offered or placed is a little better than it has been, but the improvement is very gradual. Fabricating prices show a tendency to harden although this situation remains an irregular one and some very low prices still are being made by certain shops. On a tonnage of pier work in this district, the lowest figure submitted was 2.02 cents per pound, delivered. In contrast to the spread in fabricating prices, plain material with eastern makers is firm and orders are active. The mills have such liberal bookings for the remainder of the year and their deliveries are so deferred that they will not work in any new business at less than 1.35c, Pittsburgh, or 1.519c, New York, and they continue to obtain 1.40c, Pittsburgh, on occasional orders.

Buffalo Viaduct

Buffalo, Sept. 7.—Re-advertised bids on the Chicago street viaduct work were sent to the common council for approval today. The Strobel Steel Construction Co., Chicago, is the low bidder at $184,700 for the completion of the work in six months and $183,200 in nine months. A year ago the American Bridge Co. was low bidder at $185,000 and $184,000. The re-bid of this company, based on the advance in the price of steel over a year ago is $204,775 and $202,900. Bids as high as $211,000 were received.

A faction of organized labor forced the common council to reject the original low bid of the American Bridge Co., claiming no guarantee against the employment of non-union labor. To carry this program out it was necessary to over-ride the veto of Mayor Louis P. Fuhrmann. The commissioner of public works, instead of passing on the merits of the respective bids, has put the selection of the low bidder and the entire matter up to the common council that had previously turned down the proposed contract with the American Bridge Co.

Fabricators Busy

Pittsburgh, Sept. 7. — Fabricating shops in the Greater Pittsburgh district are enjoying moderate activity and prices are much more remunerative than they have been in several months. The Carnegie Steel Co., the Jones & Laughlin Steel Co. and other large manufacturers are refusing to

shade 1.35c for structural shapes, plates and bars. Premiums of $1 more frequently are paid by consumers who want quick deliveries.

Shapes Are Steady

Chicago, Sept. 7.—Structural requirements in the west appear to be confined largely to small projects. Small fabricating shops are well filled, but nothing of importance has appeared for figuring for some time. The most important contract closed in the west recently involves 860 tons additional material for the Overland Stores Co., at St. Paul, which has been taken by the American Bridge Co. Shapes are firm at 1.54c, Chicago mill, and mills are behind on delivery, as demand from agricultural implement makers and others using structural shapes for other than building purposes is large.

CONTRACTS AWARDED.

Overland Stores Co., additional material for building, St. Paul, 860 tons, to American Bridge Co.

City and county of San Francisco, building for juvenile court and detention home, 350 tons, to Dyer Brothers.

State capitol, Oklahoma City, 147 tons.

Extension to the plant of the American Vanadium Co., at Bridgeville, Pa., 200 tons, awarded the Riter-Conley Mfg. Co.

Building for western Pennsylvania penitentiary, 100 tons, awarded the Riter-Conley Mfg. Co.

Pier sheds for the Pennsylvania railroad at Greenville, N. J., 2,500 tons, awarded the McClintic-Marshall Co.

Loft building at Forty-third street and Fifth avenue, New York City, 1,800 tons, to Milliken Bros.

Office building for Degnon Contracting Co., Long Island City, 1,000 tons, to the Hay Foundry & Iron Works.

Cold storage building for Felin & Co., Philadelphia, 250 tons, to Stewark & Stevens.

Shop buildings for the Seaboard Air Line, Portsmouth, Va., 600 tons, general contract awarded to Christian & Co.; steel to Virginia Bridge & Iron Works.

Government immigration station, Baltimore, 400 tons, general contract awarded to Dahl & Co., Cleveland.

Extensions to the plant of the Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia, previously reported, as awarded to the American Bridge Co., amount now increased to 2,600 tons.

Apartment hotel, 328-330 West End avenue, New York City, 400 tons, to the Harris-Silvers-Baker Co.

Extensions to plant of Bethlehem Steel Co., South Bethlehem, Pa., 6,000 tons to the McClintic-Marshall Co.

McCormick apartment, Washington, D. C., 700 tons to Barber & Ross.

Wetherill apartment house, Fifteenth and Locust streets, Philadelphia, 300 tons to Belmont Iron Works.

CONTRACTS PENDING.

Apartment, 115th street and Broadway, for Paterno Bros., 700 tons, bids being taken.

Westchester County Court house, White Plains, N. Y., 750 tons, Wells Bros., low bidder on general contract.

Ore Shipments

Indicate a Movement of 45,000,000 Tons for the Season

Cleveland, Sept. 7. — Although the shipments for August were very heavy, the ore on docks Sept. 1 was slightly less than that for Sept. 1, 1914, the tonnage being 7,118,847 for the former date and 7,285,150 for the latter date. The receipts at other than Lake Erie ports in August were as follows: Detroit, 57,778; Indiana Harbor, 77,774; Gary, 444,723; South Chicago, 619,270; Milwaukee, 25,910; Boyne City, 14,500; East Jordan, 7,547; Point Edward, Ont., 28,920; Deseronto, Ont., 4,823; Sydney, N. S., 3,815.

Out of a total of 8,081,117 tons of ore shipped during August, 6,504,987 tons went to Lake Erie ports, distributed as follows:

Port.	Gross tons.
Buffalo	1,037,192
Port Colborne	67,361
Erie	121,482
Conneaut	1,359,697
Ashtabula	1,336,542
Fairport	312,890
Cleveland	1,382,211
Lorain	528,848
Huron	111,656
Sandusky	.....
Toledo	189,330
Detroit	57,778
Total	6,504,987

Ore shipments on the Great Lakes during August were 8,081,117 tons, against 5,869,477 tons in August, 1914, an increase of 2,211,640 tons. The movement to Sept. 7 was 26,806,420 tons, as compared with 21,278,107 tons to Sept. 1, 1914, an increase of 5,528,313 tons. The shipments by ports are as follows:

Port.	August, 1914.	August, 1915.
Escanaba	724,951	933,162
Marquette	368,430	659,293
Ashland	662,951	931,142
Superior	1,886,418	1,375,086
Duluth	1,203,081	2,668,070
Two Harbors	1,023,646	1,514,364
	5,869,477	8,081,117
1915 increase		2,211,640

Port.	To Sept. 1, 1914.	To Sept. 1, 1915.
Escanaba	2,465,692	2,995,862
Marquette	1,049,791	1,773,653
Ashland	2,079,776	2,801,219
Superior	7,576,831	4,439,088
Duluth	4,152,367	9,378,530
Two Harbors	3,953,650	5,418,068
	21,278,107	26,806,420
1915 increase	.....	5,528,313

There is a lull in buying at present and shippers are concentrating their attention upon getting out the ore which they have sold. It will not be at all surprising if September makes as good a showing as August in shipments and careful observers are predicting that the movement for the season will amount to 45,000,000 tons.

Advance Eastern Ores

Philadelphia, Sept. 7.—Some of the leading eastern producers of magnetite iron ore have advanced prices 15 cents a ton, or about ¼ cent per unit. In certain cases the rise has been larger. The range on local ores remains 7 to 7½ cents per unit, delivered eastern Pennsylvania. Shipments the past month by some of the mines have been very heavy and stock piles have been reduced.

(For complete prices see page 504.)

Manganese Ore Statistics

Apropos of the very interesting situation that has developed in manganese ore and ferro-manganese in this country and of the present outlook for an increasing stringency in the supplies of these materials, an important table of statistics is presented in the current issue of *Metallurgical and Chemical Engineering*, from a statement issued by C. B. Morgan, secretary of the Noble Electric Steel Co. at San Francisco. This company now is producing ferro-manganese from California ore. The statistics deal with comparative imports of ferro-manganese and manganese ore and other figures of supply. They are as follows:

MANGANESE ORE

	1913. Tons.	1914. Tons.	1915. Tons.
Imports into U. S.	345,090	283,294	.....
Av. per month	28,757	23,608	.....
Imports first half 1915	.....	.....	52,007
Av. per mth.	.....	.....	8,700
Imp. into Eng.	601,177	479,435	.....
5 months ending May, 1915	.....	.....	107,297
Imports, May, 1915			5,278
Or at a yearly rate of			63,000

FERRO MANGANESE

	Tons.
Average imports in the U. S., embracing 1910-1914	100,793
Produc. from imported ore	99,363
Total available yearly supply	200,156
Average imports per month	8,399
Production	8,280
Total available monthly supply	16,679
Imports first half 1915	20,542
Possible production	15,500
Total available supply	36,042
Total avail. monthly supply	6,000

Cast Iron Pipe

Is in More Active Demand Among South American Buyers

New York, Sept. 7.—South American inquiries for cast iron pipe are more numerous with eastern shops and makers are giving closer attention toward developing these opportunities for business. A strong effort is being made to induce these buyers to accept the American specifications as to strength, size, etc. In the past, South America has been adopting the foreign specifications in which the metric system is used. Brazil is regarded as a good prospect for business and engineers of that country now are in the United States negotiating with the shops for some fair tonnages. Rio Janeiro is in the market for 1,000 tons of 24 and 30-inch

and some flexible joint pipe. Santos, Brazil, has some requirements to be filled and there are several other inquiries. A lot of 1,300 tons of 13-inch for Chile is out. For Arroyo, Porto Rico, 1,000 tons of 6 and 8-inch are being readvertised. The domestic market in this territory is being made up almost entirely of small lots, which are numerous. The eastern shops are well positioned on order books and are running about 70 per cent of capacity. A number of gas companies continue their negotiations for pipe for first quarter and first half delivery. Makers are standing out for considerably advanced prices on this business and are indifferent as to taking it otherwise, as they consider the future trade prospects encouraging. Present prices are firm. On class B, water pipe for current delivery some large producers are asking $22.50, shop, on 6 and 8's, and $25.50 on 4's. One dollar more is quoted on gas pipe.

Cast Pipe Quiet

Chicago, Sept. 7.—Little activity is present in the market for cast iron pipe, which is natural at this time of the season. Macon, Mo., will open bids Sept. 14 on 500 tons. The United States Cast Iron Pipe & Foundry Co. has been awarded 175 tons of gas pipe at Madison, Wis.

Foundries are busy and buyers of pipe are insisting on delivery of their requirements that as much as possible may be put under ground before frost.

Recent advances are holding well and a further increase in price may be made within a short time.

Pipe Mills

Are Not So Busy—Active Demand for Seamless Tubes

Pittsburgh, Sept. 7.—Iron and steel pipe mills in western Pennsylvania and eastern Ohio are operating at about 75 per cent of capacity, not being nearly so active as mills rolling other finished products. Advances in the price of crude oil will stimulate activity in the oil country fields, it generally is believed. Prices are reported to be well maintained. The boiler tube market is rather quiet and some price irregularity is reported. Demand for seamless tubes is decidedly heavy, most mills having enough orders on their books to assure activity for six or seven months.

The Ferguson Steel & Iron Co., Buffalo, advises that August shipments exceeded all former monthly records by 36 per cent. The company is building an extension to the plant and is installing considerable fabricating equipment. Charles W. Hyne, general manager of the company, is optimistic regarding the future.

Meet on Range

Lake Superior Mining Institute Convenes at Crosby, Minn., and Visits New Mines

Crosby, Minn., Sept. 9.—The twentieth annual meeting of the Lake Superior Mining Institute, which opened at Ironwood Monday, has brought out one of the largest gatherings of mining men ever registered on the iron ranges.

The local arrangements committee from the Gogebic range prepared an interesting program at Ironwood, Mich., and at Crosby, which attracted a splendid attendance. The second annual first-aid meet at Ironwood on Monday attracted 14 crack teams of experts.

On Monday afternoon the members of the Institute enjoyed an automobile trip over the Gogebic range, from Ironwood to Wakefield, visiting the mines. At the business meeting Monday evening, several hours were spent in animated discussion of the excellent papers presented.

A special train Monday night took the party over the Cuyuna range. This was the first time that a majority of the members have visited this newest of ranges. When the inspecting party arrived at the Rowe mine, the Pittsburgh Steel Co. entertained the members of the Institute with a delightful buffet luncheon at the beautiful club house. At this large open pit mine, several hours were devoted to an examination of the pit and concentration plant. Tuesday evening was featured by a barbecue at the farm of George Crosby.

Charles E. Lawrence, superintendent of Pickands, Mather & Co., at Palatka, Mich., was elected president of the Institute for the ensuing year. Vice presidents for the coming year are to be George L. Woodworth, Iron River; Frank E. Keese, Ishpeming, and Frank S. Barber, Bessemer, Mich.

Managers elected were: Frank Armstrong, Vulcan, Mich., and William Wearne, Hibbing, Minn. E. W. Hopkins, Commonwealth, Wis., was re-elected treasurer, and A. J. Yungbluth, Ishpeming, was re-elected secretary.

The members of the Institute left Crosby, Tuesday evening, for Minneapolis, to inspect the Minnesota school of mines and attend the Minnesota state fair.

(*For complete prices see page* 504.)

Spelter Prices

Are Strengthened by Improved Demand—Copper Uncertain

New York, Sept. 7.—The metal markets, while not displaying any striking weakness, have been characterized by an uncertain tone during the week closing today. Most uncertain of the metals is copper. Since the recent buying by domestic consumers, there has been little demand for copper. First hands, however, are holding firmly to their prices. Electrolytic is held by these interests at 18c, delivered 30 days. Second sellers are shading this figure and, in fact, quote as low as 17.12½c, cash, New York. On the best grades of casting copper, the market is approximately 17c to 17.12½c, delivered 30 days, while ordinary grades can be had at 16.25c to 16.50c, cash. The best brands of lake have sold at 19c, cash; prime lake is held at 17c to 18c, cash, and arsenical lake at 17.50c to 17.75c, cash.

The development of a better demand for spelter last week put an end to the recession in prices. There now is some urgent demand in the market, but this is of comparatively small proportions. Prime western is quoted at 14.75c to 15.25c, St. Louis, for spot shipment, the second half of September at 14.25c to 14.50c, October at 14c to 14.25c, and November and December at 13.50c to 14c. Brass special is quoted at 18c for nearby shipment and at 16c to 17c for futures.

A large demand for lead early last week enabled independent producers to make sales at 5c, New York, a premium of 10 points above the American Smelting & Refining Co.'s price. Since then, the demand has fallen off and while the leading producer's price continues 4.90c, New York, some outside interests are willing to do 4.85c, New York.

The tin market has sagged off slightly and the volume of business has been light. Spot and practically all other positions today are quoted at 33.25c, New York. While the sentiment is somewhat better in this market, there is very little buying.

The aluminum market continues very strong. The domestic producer has made sales for 1916 delivery at 36c for No. 1 ingot. Outside sellers ask 40c for spot shipment in carload lots, but have made some sales at 38c.

The antimony market has been uneventful. Today, importers are asking higher prices on futures and one interest quotes 29.50c, in bond, on shipment from the far east. No sales at higher figures are reported. Spot Chinese and Japanese continue available at 28c to 29c, duty paid.

Large Additions

To be Made at Bethlehem Include Mills for Standard Shapes

Important enlargements of finishing capacity will be provided by the Bethlehem Steel Co. under extensive contracts just awarded. These additions involve 6,000 tons of structural steel, the fabrication of which will be done by the McClintic-Marshall Co.

Of leading interest to the finished steel trade is the fact that a part of these enlargements will be new 12-inch and 18-inch standard structural mills with all the auxiliary equipment of blooming mills, soaking pits, etc. The output of these mills will more than double the present standard and special shape capacity of the company, making the Bethlehem company either the largest or one of the two largest producers in this line in the country. The structural mill extensions will occupy a building about 60 x 2,200 feet, requiring 2,500 tons of steel. New machine shopes also will be constructed. The main building of these will be about 80 x 500 feet, four stories. These buildings will require 3,500 tons of steel.

In connection with the reports that some steel makers have been diverting large portions of crude steel into war supplies as against their regular lines of production, the Bethlehem Steel Co. announces its shipments of structural shapes both standard and Bethlehem in August were the largest of any month in the history of the company.

In Earnest

Railroad Buying Has Started—Many Roads Figuring

New York, Sept. 8. (By wire.)—Rail buying for next year has started in earnest. The Louisville & Nashville has closed for 43,000 tons and the Atlantic Coast Line for 20,000, both placed with the Tennessee company. The Santa Fe tonnage to the Illinois Steel Co. will be about 30,000. This road has closed for a round tonnage of track supplies. The Southern and Union Pacific, the Chicago & North-Western and other roads are beginning to figure. The Bethlehem Steel Co. has taken 1,500 for the Havana Central. The Chicago & North-Western is inquiring for 500 ore cars.

New Prices Prevail

High speed tool steel manufacturers, who adopted a new list of extras July 22, last, say new prices are being obtained without difficulty. The previously prevailing list, adopted years ago, did not provide extras sufficient to cover actual costs involved in making many sizes. The new list provides prices somewhat above those offered by the one discarded in July.

Largest Tonnage

Ever Produced by Steel Corporation Now Being Made

New York, Sept. 8. (By wire.)—The Steel Corporation continues to make the largest tonnage of steel in its history. A new high weekly record was reached last week when the ingot output was over 95 per cent of capacity. This rate continues this week. One Farrell and one Isabella furnace have been started, increasing the active pig capacity to 90.

Heavy shipments last month with minimum inclination to increase sales at present promise to bring about a stand-off in tonnage statement Friday.

No Construction Work

No construction work has been started on the new works of the United States Steel Corporation at Ojibway, Ontario, despite some contrary reports recently circulated. The construction of the new plant still is deferred indefinitely. At the present time, the engineers of the Steel Corporation, having completed a survey of the site, are building and paving the main street of the town of Ojibway and thereby are placing the ground in shape for the time when actual building work will be inaugurated. Up to the present date, no appropriations have been made for the new steel works proper and all expenditures have been of an incidental and preliminary character.

Will Ship From Duluth

Chicago, Sept. 7. — Construction work on the new plant of the Minnesota Steel Co. at Duluth is being rushed with all speed and the schedule now calls for rolling operations to begin November 1. The plan is for this plant to roll billets and blooms, which will be shipped to mills of the Illinois Steel Co. at Gary and South Chicago and there be transformed into bars and other finished products.

As at present organized, rolling capacity of these plants is considerably in excess of the ingot capacity, and as the Duluth plant will work rapidly to a production of 1,500 tons per day of billets and blooms, this will relieve the situation materially in this district.

Pipe Mills

Will be Erected by Jones & Laughlin Steel Co. at Aliquippa

Pittsburgh, Sept. 8.—Of considerable interest to the iron trade of the country is the official announcement that the Jones & Laughlin Steel Co., which owns extensive plants in this district, has awarded contracts for the erection of a modern steel pipe mill at its Aliquippa department, at Woodlawn, Pa. Plans for the new mill had been under consideration for several years. It will include two lapweld and two buttweld furnaces and a skelp mill for furnishing material. Pipe mill equipment will be built by the United Engineering & Foundry Co., this city. The Alliance Machine Co., as noted in the Aug. 19 issue of *The Iron Trade Review*, will install 12 electric traveling cranes of five pounds lifting capacity each. The output of the mill, which will employ about 1,000 men, will consist of steel pipe ranging in sizes from ¼-inch to 16 inches. Figures as to the annual capacity of the tube mill department are not announced. The new mill will not be in operation until about July 1, 1916.

The Aliquippa department of the Jones & Laughlin company has been developed rapidly since 1906, when contracts were awarded for the erection of the first of a group of four 500-ton blast furnaces. The department now consists of the blast furnace plant, four Talbot tilting open hearth steel furnaces, a blooming mill, billet and bar mill, tin plate mills, rod and wire mills and 600 coke ovens.

The works of the company at Pittsburgh include the South Side mills, the Eliza furnaces and coke ovens, Soho steel works and the Soho furnace, and the Keystone mill, or structural department. The theoretical output of the company, the leading independent steel interest, is about 2,000,000 tons of steel ingots annually.

Railroad Buys Pig Iron

New York, Sept. 8. (By wire.)—The Norfolk & Western has closed for 40,000 tons of various grades of iron for next year. The American Locomotive Co. has taken 25 locomotives for Spain. The Clover Leaf is in the market for 3,000 tons of rails.

Walter A. Zelnicker Supply Co., St. Louis, Mo., has bought the business and stock of the Bintliff Supply Co. of that city. This concern does a general railway, mill and supply business and specializes in railway track tools.

MEN OF THE IRON TRADE

Who they are **Where they are** **What they are doing**

William C. Coffin, who, on Sept. 1, resigned his position with the Jones & Laughlin Steel Co., to become vice president and general sales manager of the Knox Pressed & Welded Steel Co., Pittsburgh, was vice president of the Riter-Conley Mfg. Co. from 1898 to 1908, and then became structural engineer of the Jones & Laughlin company.

Porter Essley, of the E. L. Essley Machinery Co., Chicago, has gone to the Pacific coast for a stay of several weeks.

D. S. Guthrie, sales manager of the Republic Iron & Steel Co. at Chicago, is spending his vacation at Old Point Comfort with relatives.

G. G. Thorp, second vice president of the Illinois Steel Co., Chicago, is spending his vacation in northern Michigan.

C. B. McElhany, general manager of sales of the Cambria Steel Co., has returned from a three week's vacation in the Adirondacks.

John C. Jay Jr., vice president and general manager of sales of the Pennsylvania Steel Co., has been made a director of the Driggs-Seabury Ordnance Corporation, Sharon, Pa.

T. W. Robinson, first vice president of the Illinois Steel Co., Chicago, is on the Pacific coast for his vacation, visiting the California expositions.

R. E. Graves, First National Bank building, Pittsburgh, has accepted the agency for the William Cramp & Sons Ship & Engine Building Co., Philadelphia, in western Pennsylvania.

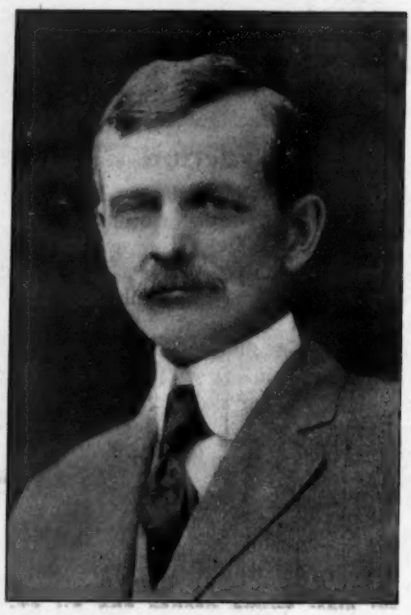
James W. Rawle, for many years associated with the Bethlehem Steel Co. and at present vice president of the J. G. Brill Co., Philadelphia, has been made a director of the Driggs-Seabury Ordnance Co.

Prof. Otto Rausenberger, who designed the 42-centimeter Krupp gun, has received the degree of Doctor of Engineering Honoris Causa, from the Technical Academy at Karlsruhe, according to a dispatch from Berlin.

Clarence W. Daniels, son of the late Fred H. Daniels, chief engineer of the American Steel & Wire Co., and formerly a draftsman for the Norton Co., Worcester, Mass., has been made chief engineer of the latter to succeed Harry E. Osgood, resigned.

Alden D. Perley has been appointed superintendent of the Hall furnace of the Republic Iron & Steel Co., Sharon, Pa., which is being blown in this week. Mr. Perley graduated from Sheffield scientific school, Yale university, in 1913, and in the fall became affiliated with the Republic company at Youngstown. For a time he was on the labor gang, then at the stoves, and finally had experience in blowing a furnace.

Louis Bloomfield announces that he has resigned as assistant sales agent



WM. C. COFFIN,
Vice President, Knox Pressed & Welded Steel Co., Pittsburgh

of the American Steel & Wire Co., Cleveland, to enter the general practice of law, at 1028-30 Engineers' building. Mr. Bloomfield has a record of doing well anything that he undertakes, whether at work or play. His success as a salesman has been attested by his rapid promotion, and while attending to his duties in connection with the company, he has been studying law, and some months ago was admitted to the bar of Ohio. He is also an accomplished golf player.

Grant D. Bradshaw, steam engineer, Cambria Steel Co., Johnstown, Pa., has tendered his resignation effective Oct. 1. He will become president of the Andrews-Bradshaw Co., sales engineers, Pittsburgh, which will make a specialty of steam and combustion equipment. Mr. Bradshaw came to Cambria in 1910 as assistant steam engineer and was appointed steam engineer in the spring of 1911. Previous to his arrival in Johnstown, he was connected for one year with the Indiana Steel Co., at Gary, and for five years with the Illinois Steel Co. He is the inventor of the Bradshaw gas burner for blast furnace and producer gas, which, besides its use at Cambria, has been adopted by a large number of plants. Mr. Bradshaw expects to locate permanently in Pittsburgh.

Death of C. M. Cabot

Charles M. Cabot, who as a stockholder of the Steel Corporation, gained some prominence several years ago by attacking labor conditions in the iron and steel industry, died at his home at Beverly Farms, Mass., Sept. 5. He was 49 years of age. Mr. Cabot served as a member of a committee of stockholders which investigated the general conditions among employes of the Steel Corporation and made certain recommendations subsequently put into effect. In business life he was engaged as a broker.

Alexander Tropenas, inventor of the Tropenas converter, died on July 14 at Lyons, France, at the age of 55.

Charles T. Wills, a prominent building contractor, of New York City, and president of Chas. T. Wills. Inc., died at Greenwich, Conn., Aug. 31, after a short illness, aged 64 years. The firm of Mr. Wills erected many of the prominent buildings in New York City, including the New York Stock Exchange.

Richard H. Burdsall, of Port Chester, N. Y., died Aug. 30, at his country home at Great Barrington, Mass., of heart disease. He was a prominent business man of Port Chester and was treasurer of the Russel, Burdsall & Ward Co., manufacturer of nuts and bolts.

Installs Furnace.—The American Steel Foundries has installed and is now operating a 6-ton electric furnace of the Heroult design at its Indiana Harbor, Ind., plant for the production of extra quality steel castings.

Money and Iron: Fact and Comment

Change in German Submarine Policy Helps Market—Keen Interest in Adjustment of Exchange Problem

THERE can be no question that the financial problem which is now confronting the belligerent nations of Europe is a very serious one. The tremendous expenditures connected with the war continue to pile up with no prospect of relief. While, of course, England and France are still able to buy without much difficulty, sellers will not contract with Russia and other countries except upon terms that are thoroughly satisfactory from a financial standpoint. The Balkan states have been trying to place orders for munitions, but such orders will not be accepted unless guaranteed by England, and such guarantee will not be forthcoming until it is assured that the Balkans will fight for the allies. The Balkan statesmen apparently have put up the services of their countries, so that the belligerents offering the largest amount in territory and other valuable considerations will obtain them. If the Balkans should decide to fight for Germany and its allies, there will be no buying in this country, because Germany could not assure the delivery of the munitions as long as England controlled the seas.

England and France will, of course, make a desperate effort to meet not only their own obligations, but also those of their allies, and the history of wars show that often money has been produced from unexpected sources long after it seemed that all sources had been exhausted. America will, of course, await with deep interest the pending conference for the bracing up of the foreign exchange situation and will be ready to sell to any belligerents who can give satisfactory assurance that materials will be paid for.

THE past week was one of considerable uncertainty especially in the first few days, when there was an acute crisis in foreign exchange. When it became known that Germany had acceded to the doctrine of the United States concerning submarine warfare, there was decidedly better feeling on the New York exchange, but the problem of foreign exchange is not yet solved. The coming of representatives of England and France to determine what is to be done to restore exchange conditions is looked forward to hopefully, and it is confidently expected that some satisfactory plan will be agreed upon. Since the announcement that Germany would abandon her policy of torpedoing passenger boats without warning, money has been flowing more freely into investment channels. General developments in the various lines of industry have been helpful to the stock market.

Quotations at the close of business Sept. 4 and changes in the leading stocks identified with the iron and steel industry for the week are shown in the following table:

	Close Sept. 4.	Net chge.
American Can	58¼	—2½
American Can, prfd.	105	—1
Amer. Car & Fdy. Co.	68¼	—3¼
Amer. Car & Fdy. Co., prfd.	116½	—1½
American Locomotive	53½	—2
Amer. Locomotive, prfd.	97	.....
American Steel Foundries	53½	— ⅛
Baldwin Locomotive	80½	+1
Baldwin Locomotive, prfd.	106½	+1½
Bethlehem Steel	287	—4
Bethlehem Steel, prfd.	142	+2
Colorado Fuel & Iron	47½	+4⅞
Continental Can	83	—3½
Continental Can, prfd.	102½	.....
Crucible Steel	83⅜	+7½
Crucible Steel, prfd.	104	+2⅞
General Electric	171⅜	—1½
Inter. Harv. of N. J.	106½	—2⅜
Inter. Harv. of N. J., prfd.	115½	+5½
International Harv. Corp.	70¼	+ ¼
Lackawanna Steel	69⅜	+2⅛
Nat'l Enamel'g & Stamp. Co.	27¼	—1⅛
Nat'l Enamel'g & Stamp. Co., prfd.	89	.....
Pressed Steel Car	63½	+1¼
Pressed Steel Car, prfd.	100½	+ ⅜
Pullman Palace Car	159¼	— ⅜
Republic Iron & Steel	43	—1¾
Republic Iron & Steel, prfd.	101¼	—1
U. S. Cast Iron Pipe & Fdy.	19½	—1½
U. S. C. I. Pipe & Fdy., pfd.	41	—5
United States Steel	75¼	—1⅛
United States Steel, prfd.	112⅞	+ ⅛
Westinghouse Mfg.	115¾	— ⅛

Using Paper Money

Office of *The Iron Trade Review*,
Prince's Chambers, Corporation St.,
Birmingham, Eng., Sept. 1.

Next to the great German drive in Russia, over which the enemy is naturally elated, America monopolizes public interest on several grounds. There is natural speculation as to whether the sinking of the ARABIC will prove to be the last straw overcoming America's long-suffering patience. It cannot be said that there is any great eagerness here to see America involved. On the other hand, it is rather gratifying that there still remains one great nation able to transact business as usual, and devote itself mainly to occupations of peace. From the British point of view, we are very well satisfied with the share America is taking in the fight to vindicate those ideas of civilization and humanity, for which the Anglo-Saxon races on both sides of the Atlantic are equally concerned. There is a very intelligent appreciation here of the exceptional difficulties under which America labors, in a crisis like the present—difficulties especially arising from the cosmopolitan and very largely German character of her population. Financiers are discussing a good deal the question of international balances as they are affected by the preponderance of imports from America over British exports to America. There seems no doubt now that the balance will be struck either by a special shipment of gold to America, or by the floating there of a British war loan. Gold here continues fairly plentiful, but this is because the government has taken decided action in appealing to business men to use paper money instead of gold. The banks have taken this request very much in the light of an order, and paper money is circulating much more freely than it was. There are signs of a growing popularity of paper money, many applicants asking for £1 notes instead of gold. There is a general belief that paper currency has come to stay. In some respects it is much more convenient than gold, this quality outweighing even the great prestige of the British form of that commodity. With regard to the progress of the war, we have overcome the first shock which followed Germany's great successes; and the enormous increase in the output of munitions, as well as the very numerous transports of men to the continent suggest that some unpleasant surprises are in store for Germany, when she again turns her attention to the western area. The latest report states that the government now controls 535 works for the production of ammunition, all these having been taken over since July 12. However, we are under no illusions as to the duration of the war, and in the words of Lord Selborne are preparing for and looking forward to a "long and grim struggle". We have again a rather large strike on hand, the miners having once more kicked over the traces, but we hope the stoppage will be of short duration.

Steel Works Stacks Gain Heavily

And Total Production of Pig Iron in August Was Largest Since May, 1913—Merchant Plants Gain Slowly

WITH the largest number of stacks blowing since September, 1913, and the largest output since May, 1913, the coke and anthracite pig iron production of the country in August reached a total of 2,774,825 tons. This total production in August was at the yearly rate of 33,300,000 tons, which compares with the yearly rate of 24,000,000 tons in August last year.

The total output in August, 2,774,825 tons, was 211,514 tons greater than July which produced 2,563,311 tons. The August output showed a gain of 1,279,500 tons over the production in December, 1914, or a gain of 85 per cent. It also was a gain of 778,342 tons over August, 1914, or an increase of 39 per cent. The average daily production in August was 89,510 tons as against 82,687 tons in July, an increase in August of 144,839 tons. Yet the merchant furnaces also made a gain in output, their August total production being 652,067 tons compared with 595,070 tons in July, or a gain in August of 56,997 tons. The steel works furnaces in August had a daily average output of 67,467 tons, a gain of 4,672 tons over their average in July, when they produced at the daily rate of 62,795 tons. The merchant furnaces in August gained slightly also, in daily rate, which was 21,034 tons, a gain of 1,838 tons over July when their average was 19,196 tons.

The production of spiegel in August was 12,367 tons compared with 10,056 tons in July, a gain in August of 2,311 tons. The output of ferro in August was 18,907 tons compared with 11,540 tons in July, or a gain in August of 7,367 tons.

The total active stacks on the last day of August was 246, a net gain of 12 to the active list of July, when 234 stacks were active. Again the steel works furnaces showed a statistical gain for, while five merchant furnaces blew out and ten relighted, leaving a net gain of five merchant stacks to the active list, yet only two steel works stacks blew out and nine blew in, making a net gain of seven active stacks in the steel works division.

MONTHLY PRODUCTION.

	1915.	1914.	1913.
January	1,591,024	1,879,336	2,787,800
February	1,666,592	1,888,607	2,578,670
March	2,046,280	2,341,551	2,762,823
April	2,114,518	2,261,501	2,754,353
May	2,255,157	2,097,019	2,816,825
June	2,369,932	1,904,566	2,616,883
Total 1st half	12,043,503	12,372,580	16,317,354
July	2,563,311	1,955,324	2,558,275
August	2,774,825	1,996,483	2,537,018
September	.....	1,882,718	2,494,098
October	.....	1,767,227	2,539,924
November	.....	1,501,269	2,229,960
December	.....	1,495,325	1,976,138
Total 2d half	.....	10,598,346	14,335,413
Grand total	17,381,639	22,970,926	30,652,767

AVERAGE DAILY PRODUCTION.

	1915.	1914.	1913.	1912.
January	51,323	60,624	89,929	66,220
February	59,521	67,450	92,095	72,372
March	66,009	75,534	89,123	77,791
Apr.	70,484	75,383	91,812	79,254
May	72,747	67,646	90,865	80,753
June	78,998	63,486	87,229	81,125
July	82,687	63,075	82,525	77,502
August	89,510	64,403	81,839	80,650
September	.....	62,757	83,137	81,482
October	.....	57,007	81,933	86,569
November	.....	50,042	74,322	87,985
December	.....	48,236	63,746	89,590
Average	71,409	62,934	83,980	80,124

687 tons in July, a gain of 6,823 tons in August.

The steel works furnaces supplied two-thirds of the increase in the August production, for in August they made 2,091,484 tons compared with 1,946,645

AUGUST PIG IRON

States.	No. of stacks.	No. in blast last day of month. Aug.	July.	Total tonnage made. Merchant.	Non-Merchant.	——Totals.—— Aug.	July.
Pennsylvania	157	104	98	166,308	1,008,221	1,174,529	1,107,887
Ohio	73	50	50	151,527	488,519	640,046	601,478
Alabama	45	20	20	115,983	64,722	180,705	165,662
Virginia	22	5	4	19,961	.....	19,961	20,689
New York	26	18	18	96,575	97,720	194,295	177,897
New Jersey	6	1	1	6,800	.....	6,800	5,961
Illinois	26	18	15	24,299	224,989	249,288	203,613
Colorado	6	2	2				
Indiana	10	10	10	26,026	181,336	207,362	206,836
Maryland	4	3	2				
Wisconsin	6	3	3				
Kentucky	7	1	0				
West Virginia	4	3	3	19,560	25,977	45,537	26,946
Tennessee	18	5	5				
Washington	1	0	0				
Georgia	2	0	0				
Texas	3	0	0				
Minnesota	1	1	1	25,028	.....	25,028	24,746
Michigan	3	2	2				
Missouri	1	0	0				
Spiegel—All states...						12,367	10,056
Ferro—All states....						18,907	11,540
Totals	421	246	234	652,067	2,091,484	2,774,825	2,563,311

Blast Furnace Notes

No. 2 North Birmingham stack of the Sloss-Sheffield Steel & Iron Co., was blown out Aug. 30.

The Tennessee Coal, Iron & Railroad Co. lighted No. 4 Bessemer stack Aug. 14.

The Ashland Iron & Mining Co., Ashland, Ky., relighted one stack Aug. 3.

The Maryland Steel Co. blew in No. 4 stack at Sparrows Point on Aug. 14.

Northern stack of the Northern Iron Co. was relighted Aug. 23 and Standish stack went out Aug. 21.

Bessie stack at New Straitsville, O., of the Bessie Furnace Co., was blown out early in August.

The Andrews-Hitchcock Iron Co. lighted its new No. 2 stack at Hubbard, O., Aug. 31, after blowing out No. 1 stack on Aug. 30.

The Carnegie Steel Co. blew out on Aug. 20 one of its two active stacks at Bellaire, O.

The Colonial Iron Co., Riddlesburg, Pa., applied the torch to its stack Aug. 29.

The Pennsylvania Steel Co. blew in No. 4 stack of its Steelton group on Aug. 12.

Crumwold stack of the Reading Iron Co. was relighted Aug. 17.

The Shenango Furnace Co. applied the torch to No. 4 stack at Sharpsville, Pa., on Aug. 30.

The Bethlehem Steel Co. relighted a stack at South Bethlehem Pa., on Aug. 17.

The Jones & Laughlin Steel Co. put another Aliquippa stack in operation in August.

The Oriskany Ore & Iron Corporation, Lynchburg, Va., blew in its stack on Aug. 7.

The Princess Furnace Co. put its Virginia stack in blast on Aug. 2.

Crozer blast furnace of the Virginia Iron, Coal & Coke Co. was blown out Aug. 8.

The Illinois Steel Co. relighted three stacks in August; South works stack No. 10 on Aug. 4, Joliet No. 2 on Aug. 14 and "E" stack at South Works on Aug. 18.

An Old Bell.—The Ewald Iron Co., which owns the old Tennessee Rolling Mill in Lyon county, Ky., has just brought to Louisville the old bell, which has been at the mill for 59 years. The bell weighs 731 pounds, and was cast in the Buckeye Foundry at Cincinnati in 1856 by G. W. Goffman, head of the plant. It was then transported down the Ohio river to the rolling mill, which was one of the pioneer plants of the kind in the west. The mill has not been in operation for a good many years, however, and it was only recently that Baylor Hickman, head of the company, decided to rescue the bell and restore it to service.

How to Select Proper Mill Controllers

First of Two Articles Discussing Use of Alternating Current Controllers on Induction Motors—Advantages and Disadvantages of Various Types

BY ARTHUR SIMON

TWO PRINCIPAL types of alternating-current motors, which are quite distinct in their characteristics—the commutator type motor and the induction motor, are now on the market. Little need be said about the commutator type motor, because its practical development has been seriously delayed in this country. The induction machine is built with either a squirrel-cage or a wound-rotor type of armature. The former may be used for constant-speed work and the latter for either constant or varying speed work, but neither one

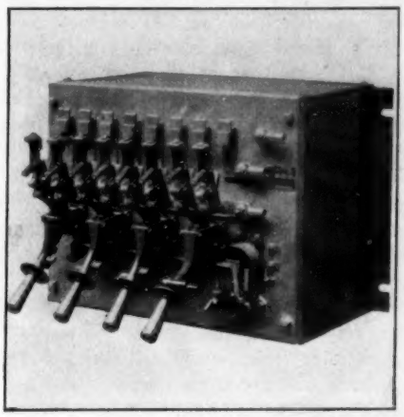


FIG. 1—MULTIPLE-LEVER TYPE CONTROLLER, SECONDARY STARTER WITH NO-VOLTAGE RELEASE

is adaptable for adjustable speed work. The squirrel-cage motor on account of its simplicity, the absence of a collector, and its staunchness, is a most desirable machine for steel mill service. Its disadvantages are usually a low starting torque and a high starting current. It cannot, therefore, be employed where heavy starting friction has to be overcome, and it is, of course, not suitable for the frequent reversal and acceleration of heavy masses.

The slip-ring type motor, on the other hand, does not have these disadvantages, but it requires a collector which is the cause of frequent trouble. On account of the necessity of short circuiting the armature over the slip-rings, brushes and some external connections, the rotor losses are greater than they are in an equivalent squirrel-cage machine, and the efficiency of the slip-ring motor is, therefore, somewhat lower. In very large systems, the voltage in the armature is relatively high, in order to reduce the current to a reasonable value, and this leads to insulation troubles on the slip-rings.

The question of control must also take into consideration purely commercial points. We must weigh the relative advantages of low first cost, power consumption, labor and attendance and the renewals. The effects of these different points are more or less contradictory to each other, and they, therefore, have to be weighed carefully before deciding upon a particular type of motor and controller.

All types of controllers may be divided into two classes, hand and automatic controllers. From the standpoint of first cost, the hand controller is usually the cheapest, but, on the other hand, cost of attendance for its operation, increased power consumption due to improper operation and cost of renewal, due to unwise handling of the controller, may be more than sufficient to counter-balance the increased cost of a full automatic controller.

Face-Plate Type Controllers

The simplest and earliest type of controllers were of the face-plate type. These controllers are used in connection with squirrel cage motors for the control of resistance in series with the primary circuit, and in slip-ring type motors, in which case they are usually arranged to handle only the secondary circuit. The controller usually is self-contained, with the resistance mounted back of the panel. It is necessary to install a separate switch to handle the primary circuit.

A modification of the face-plate type controller which is particularly suitable for large capacities, and which is being built in sizes up to several thousand horsepower, is illustrated in Fig. 1. This is the multiple-lever type in which a series of switches similar to those on circuit breakers control the starting resistance. These levers are equipped with laminated-brush main contacts and carbon-to-metal auxiliaries, which are easily renewable, and which handle the arc due to the commutation of the resistance.

The great advantage of this controller is that the starting resistance cannot be cut out too suddenly, because the operator has to close one handle after the other, which requires some appreciable time. The controller illustrated is equipped with a no-voltage release, which is connected with the primary circuit, so that all of the resistance is inserted when the primary switch is opened or when the primary power supply fails. It is advisable to install a no-voltage release primary switch, so that the motor is entirely cut-off the line in case

FIG. 2—SECONDARY FACE PLATE TYPE CONTROLLER, SPEED REGULATOR WITH PRIMARY SWITCH AND OVERLOAD RELAYS

of failure of power. Upon the closure of the primary switch, all resistance is already inserted in the circuit, and the motor may be started up in the usual manner.

The starting of squirrel-cage motors with resistance in the primary circuit is to be recommended only for small machines which start without load. The squirrel-cage motor is usually designed to start with between 1½ and three times its normal torque, and a corresponding starting current varying from seven to 3½ times its normal current. The higher the current, the lower usually is the starting torque. For a given motor this starting torque is proportional to the square of the inrush current or starting voltage, and, therefore, a comparatively slight decrease of the inrush current by means of resistance will cause a large decrease of the starting torque. Hence this method is not to

Presented at the recent Pittsburgh meeting of the American Institute of Electrical Engineers.

be recommended where motors have to start frequently and under heavy load. The face-plate type controller for use in connection with slip-ring motors, on the other hand, is a very satisfactory device if only infrequent starting is required. As with all face-plate type controllers, the limitation of this type lies in the fact that very heavy currents cannot be handled easily on sliding contacts, so that the multiple-lever type is used where the current to be handled becomes too high. The face-plate type controller may also be used for speed regulation. For larger sizes we would rely also upon the multiple-lever type controller.

Fig. 2 shows how the face-plate type speed regulator may be interlocked with overloads and a primary switch so as to permit of starting and stopping from a distance.

It would seem possible to stop the slip-ring type motor by simply opening the secondary circuit, but this is not considered good practice because the closing of the primary circuit of an induction motor with the secondary circuit open may give rise to serious voltage surges which endanger the insulation of the motor windings. Controllers, therefore, always should be arranged so that the primary circuit is opened for stopping.

The opening of the secondary circuit without opening the primary circuit has another disadvantage, namely, that the motor continues to be excited from the primary circuit and there is a great loss of energy due to the iron losses on both the stator and the rotor. The rotor iron losses are higher at standstill than they are when the motor is running at full speed, as the frequency in the rotor at standstill is equal to the primary frequency. Unless the motor is designed very liberally, the lack of ventilation may cause a burn-out, though only the magnetizing current is flowing in the primary circuit.

Where infrequent starting is required, the resistance has sometimes been immersed in oil in order to give a higher starting capacity, although this method has never found a great deal of favor in this country on account of the inconvenience of the oil tank. The only advantage claimed by its advocate is the saving in spacing and cost. The saving in space, however, is only small, and under American manufacturing conditions there is no saving in cost, as the oil tank and increase in weight, generally causes an increase in cost which far outweighs the saving in resistance materials. Furthermore, in large capacities, the controller can be arranged only for floor mounting, and in this case, it cannot compare with the open-type starting resistance which permits of a very light and pleasing design, and which can be arranged for mounting in any position.

Special Crane Controller

A face-plate controller of special design is sometimes used for crane work where slip-ring motors have to be reversed frequently. This controller has two fronts, one of which serves as a reversing switch for the primary circuit, while the second, provided with a three-arm lever, controls the secondary circuit of the motor.

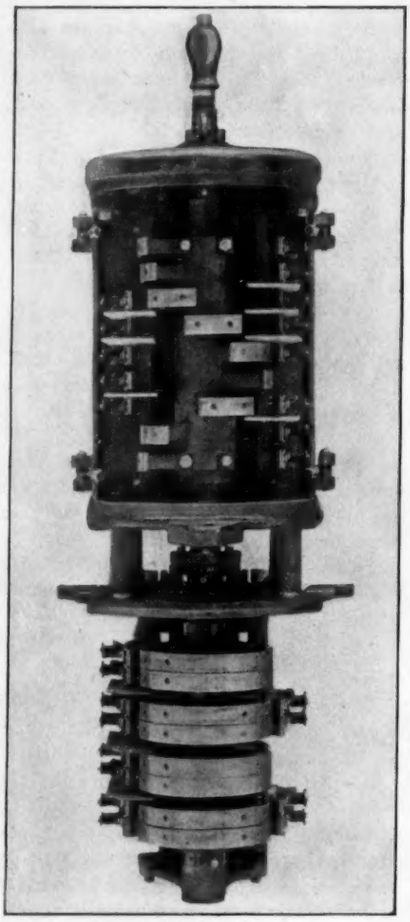


FIG. 3—ALTERNATING CURRENT DRUM CONTROLLER WITH PRIMARY OIL SWITCH

The controller is equipped with renewable segment and skate-shoe type of contacts. This controller is suitable for smaller capacities of crane motors up to perhaps 50 horsepower. Its only disadvantage is that the contacts are exposed and an operator might easily touch them. It has, therefore, been considered preferable in late years to enclose the contacts entirely and so this controller has been replaced more or less by the well known drum-type controller.

The general design of this controller is so well known that it hardly needs any comment. The contacts controlling the secondary resistance are arranged so that the latter is cut out in rotation, one step in one phase at a time. The different phases are, therefore, only balanced on a limited number of points, but this is not objectionable if the stepping in of the different phases is arranged so that a minimum of unbalancing is obtained at all times. It has been found that an unbalancing up to 40 per cent in the relative values of the currents in the three rotor phases does not seriously affect the operation of the motor.

Where large amounts of energy are handled in direct-current drum controllers, a blow-out is used to extinguish the arc due to the opening of the circuit. Such blow-outs are not so easily adapted to drum controllers for alternating current and therefore some other means have to be adopted for handling larger currents. The problem has been solved easily by the use of an oil switch, and it is now universal practice to interrupt the circuit of larger motors in oil. For this purpose an oil switch, containing the primary contacts, is usually mounted below that portion of the drum which handles the secondary circuit, or behind the drum. In the first case, the switch is, usually, also of drum construction, the same as the rest of the controller. In the latter case, the switch may be in the nature of an oil circuit breaker construction. The drum controller lends itself not only to the control of motors for intermittent service such as cranes, but also to the speed regulation where the motor runs at a definite fixed speed for the greater length of time. The construction of these speed-regulating drum controllers is the same as those for intermittent service.

Fig. 3 shows a larger size drum controller in which the primary circuit is arranged at the bottom, and is immersed in oil. The oil tank which screws to the top plate of the bottom portion is not shown.

When drum controllers are used for intermittent service, such as cranes, and the circuit has to be interrupted frequently, care must be taken in the design of the primary switch, especially if it is immersed in oil. The energy which is dissipated on the interruption of the circuit in the oil must be carried away, as heat, through convection and radiation. If the cooling surfaces of the oil tank are too small, the oil temperature would be raised to a dangerous point which may cause an explosion. This will blow all of the oil out of the tank and may cause the destruction of the oil switch, or a fire. In order to avoid this, the tank

not only must have sufficient oil capacity, but ample radiating surface.

In the design of oil switches used for circuit breakers the designer usually endeavors to reduce the amount of oil required to a minimum on account of the fire risk. Such circuit breakers operate but very seldom and, therefore, the heat storage capacity of the oil and the radiating capacity of the tank are of minor importance. This is different in case of oil switches used for controller work, for they have to operate frequently. In this case, the switch must be designed with ample heat storage and radiating capacity, and a switch which may be very satisfactory as a circuit breaker would not necessarily stand up under controller service conditions, as has been proved by the frequent failures in cases where primary oil circuit breakers have been adopted for drum control for intermittent service without any modification.

Figs. 4 and 5 show respectively a small and a large capacity switch constructed according to this design. The contacts are arranged in such a manner that the arc is formed horizontally and not vertically, as in the usual circuit breaker construction. This has proved to be very valuable, as the arc is apparently extinguished quicker, and therefore the oil is not carbonized as rapidly as with a vertical break.

The switch shown in Fig. 5 has been built in capacities up to 500 amperes at 6,600 volts. In an installation where the switch handles a 1,000 horsepower three-phase motor, and where it has been installed for five or six years, it controlled this motor circuit some 50,000 times, and not the slightest amount of carbon has been found in the oil surrounding the contacts, although a good deal of deposit is found at the bottom of the tank. The reason for this is, that with the movement of the contacts as arranged in this switch the oil deposits are not stirred up as violently as they are in the usual oil circuit breaker.

Drum controllers are now manufactured in capacities up to several hundred horsepower, but as the sizes of the motors to be controlled increase, the contact parts become larger and more numerous, and, therefore, the power to be exerted for operating the drums also increases tremendously. The limiting capacity for the operation of a drum controller is the power which can be exerted without strain by the operator. Another limiting feature in the use of the drum controller is the wearing of the contacts. The contacts at the different points are made and broken slowly, and this necessarily increases the amount of wear due to the arcing, where very large powers have to be handled. The arcing and the resulting wear, as a consequence becomes increasingly severe.

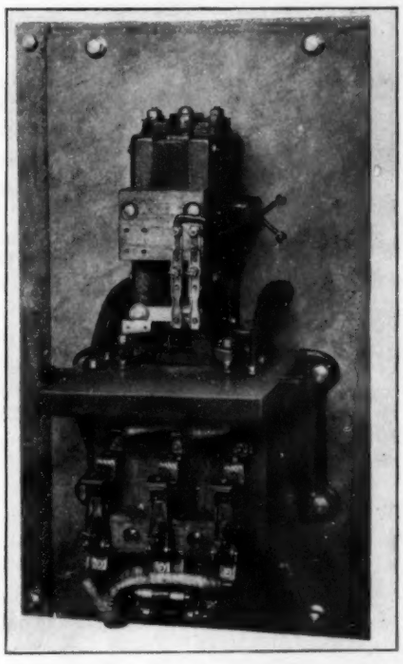


FIG. 4—SMALL SOLENOID-OPERATED OIL SWITCH WITH TANK REMOVED

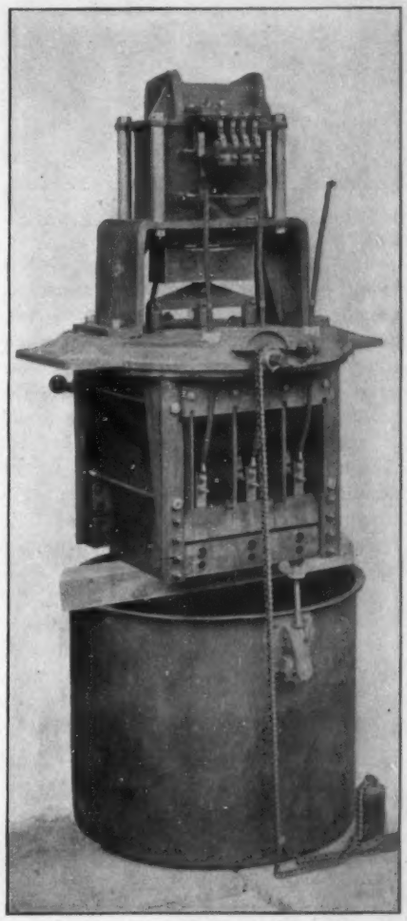


FIG. 5—LARGE SOLENOID-OPERATED OIL SWITCH WITH TANK REMOVED

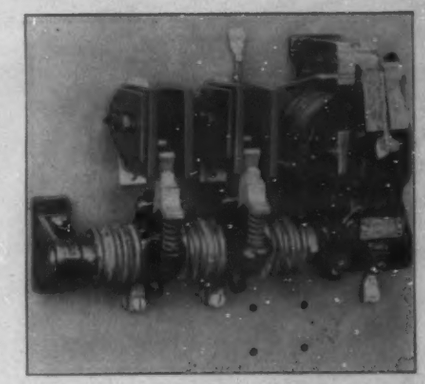


FIG. 6—DOUBLE POLE ALTERNATING CURRENT CLAPPER SWITCH

Where the drum controller is insufficient to handle the required capacity, or where very frequent operation is necessary, and it would tire the operator when handling a large drum, a multiple solenoid type of controller is resorted to. This consists of a number of solenoid operated, or clapper switches, as illustrated in Fig. 6.

Fig. 7 shows panels on which a number of magnet switches are mounted. These switches are suitable only for low-voltage currents, usually up to 550 volts. Where higher voltages have to be handled, the solenoid-operated oil switch is easily preferable and is the most universal device. In Fig. 8 is shown, however, an air-break switch arranged for 2,200 volts, which has been used successfully in several instances.

The multiple solenoid controller consists of a number of clapper switches as illustrated. The magnets of the clapper switches are energized from a pilot controller, which, therefore, has only to handle the magnetizing current of the magnets. The pilot controller consists of a small drum or similar device.

The simplest form of the multiple solenoid controller is non-automatic in operation. The energizing of the different clappers, and the speed of cutting out of the resistance is left entirely to the skill of the operator. For large systems this mode of operation is, of course, objectionable because too rapid handling of the master controller will cause excessive current surges on the line, and undue stress on the motor and machinery. Therefore, automatic control is resorted to.

This type of controller is the most important to the steel mill engineer. The automatic feature of the controller consists of one or more current-limiting relays, which are connected either to the primary or the secondary circuit of the motor, and which prevent too rapid cutting out of the re-

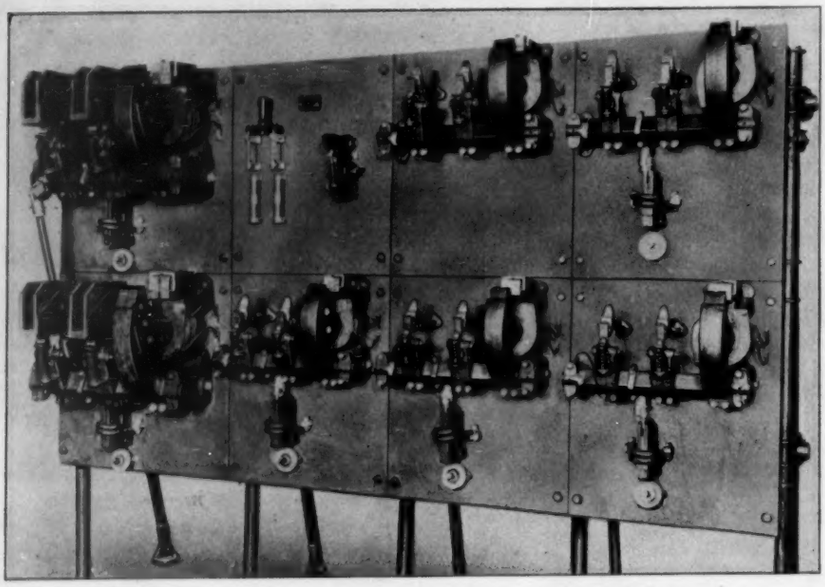


FIG. 7—PANEL WITH ALTERNATING CLAPPER SWITCHES AND SECONDARY SERIES RELAYS

sistance. The operation of this current-limiting relay is well known, and it has been used on different motors for a good many years. We shall, therefore, discuss only those features which distinguish it when used in alternating current systems.

The largest field for the current relay controllers for alternating current motors is, of course, the slip-ring type. In this motor the primary circuit is connected directly to the line while resistance is inserted in the secondary circuit and is gradually short circuited, to accelerate the motor to its full speed. Both the primary and secondary current vary with the load and the speed under normal conditions. The secondary current is approximately proportional to the torque exerted by the motor in about the same way as in a shunt-wound direct-current motor. The secondary current becomes zero when the motor runs idle. The primary current, on the other hand, is not a straight line function of the torque because the primary circuit supplies, besides the load current, the magnetizing current of the motor. This magnetizing current in modern motors is about 30 per cent of the full-load current.

There are today two methods of operating automatic controllers with current-limiting relays; one method is by putting one or several relays in the primary circuit, and the other method by putting the relays in the secondary circuit of the motor. In Fig. 9 is shown a relay arranged for connection to the primary circuit. The primary relay requires for a certain range, between maximum and minimum torque, at which the relay is to act, a more accurate adjustment than the secondary relay, because the primary current does not fall off as rapidly as the torque. It has the further disadvantage that it cannot be cut out when it has done its work, except by the addition to the controller of another switch of sufficient capacity to handle the primary circuit. The installation of such a switch is objectionable on account of its cost. The primary relay, therefore, has to be designed for continuous service which makes it rather bulky and sluggish on that account. On the other hand, the secondary relay can be connected so that it is cut out by the same switch which cuts out the secondary starting resistance, and therefore would have to be designed for very intermittent duty only, and would be correspondingly light and sensitive.

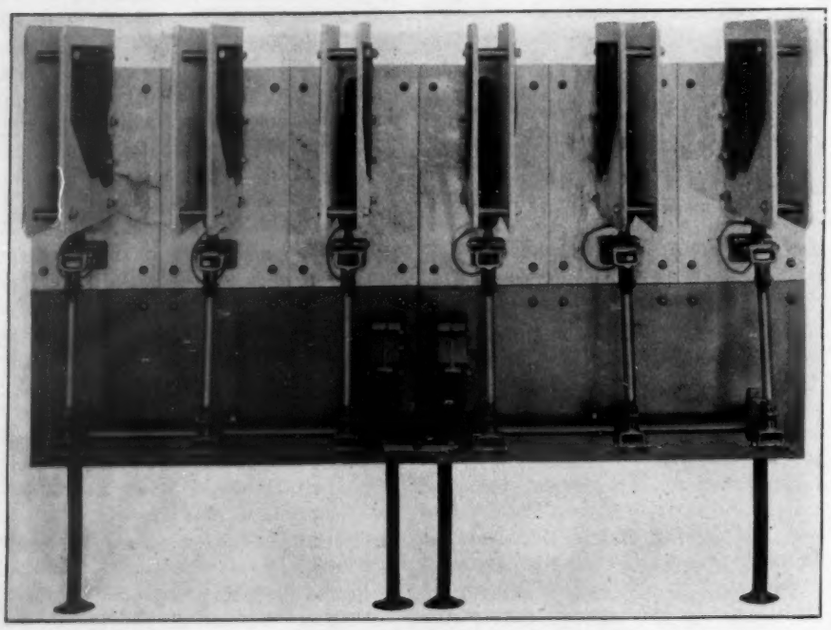


FIG. 8—2,200-VOLT TRIPLE-POLE AIR-BREAK REVERSE SWITCH

Fig. 10 shows a multiple-relay type of controller which relays in the secondary circuit, one relay being employed for each step of resistance, and the different relays are so connected that they always form the star point of the resistance in circuit, and are cut out when the corresponding resistance step is cut out of circuit by the succeeding clapper switch. As the relay itself forms the star point of the resistance, and therefore the potential difference between any two points of the relay is only equal to the drop in the relay coil, it is necessary to insulate these coils only very lightly from each other.

The relay in the secondary circuit has an apparent disadvantage due to the change in frequency of the current in the secondary circuit. When a motor operating on a 25-cycle circuit having a slip of 5 per cent reaches normal speed, the frequency in its secondary circuit is only 1¼ cycles per second. As the relay has, of necessity, very light moving parts, this low frequency would cause it to pump up and down, unless it was provided with some means for limiting such pumping, such as a shading coil, which at low frequency is not very effective.

Another way to avoid the pumping is to make use of the fact that the total pull exerted by three equal coils which are connected in the three phases of the secondary circuit is constant as long as the current is balanced and constant. These relays are wound with three coils which are connected together at one end, while the other ends are connected to the

respective clappers and resistances. The relay has an absolutely constant pull regardless of the frequency of the secondary circuit. It can therefore be made more sensitive than a relay which is connected to one phase only, and is provided with shading coils or other means to prevent it from chattering. As stated previously, the use of the shading coil will not protect against chattering.

In order to get a constant pull with this arrangement it will be necessary to have the shading coil flux displaced 90 degrees from the main flux, and to have both of equal magnitude. This result cannot be accomplished, and therefore the relay will have a tendency to chatter as the frequency in the secondary circuit decreases with increasing motor speed. The pull on the plunger of the relay varies, therefore, between a given minimum and maximum, even with constant effective current flow in the secondary circuit, and when the frequency is low, and the inertia of the plunger which tends to hold it up is relatively small, the relay will drop before the effective current in the secondary circuit is equal to that for which the device is adjusted. Hence such a relay will always work more or less erratically, and at the best it will require a much wider limit of setting than the three-phase relay described above.

"Jamming" Relays

It is, of course, not necessary to have the three coils of the secondary relay connected so as to form the neutral point of the resistance. In some cases it is necessary to have the three coils insulated from each other. This is the case where the relay is used as a "jamming" relay, in which case it has to be connected ahead of all of the resistance and directly behind the slip-rings of the motor. Where the secondary circuit has a relatively high voltage, and in motors of large capacity, it is, of course, possible to connect the relays to current transformers inserted in the secondary circuit instead of connecting them directly into the latter. This is particularly valuable in case of the "jamming" relay, which otherwise would always have to be insulated for the maximum secondary voltage.

There is still a good deal of discussion as to the advisability of using a single relay controlling several steps of resistance instead of a separate relay for each step. It seems to the writer that the latter method is to be preferred, because it is possible to set the different relays for different currents. This is a particularly valuable feature in machinery such as centrifugal pumps and so on, where the torque required to accelerate the motor varies between the low speed and high speed. Each relay is then set for the different accelerating currents, a feature which cannot be obtained with a single relay in the primary or secondary circuit. The simplest kind of current relay controller is a non-reversible self-starter for use in connection with machinery which always revolves in the same direction. Instances of this kind are centrifugal pumps, blowers, compressors and so on. The operation of such machinery represents nothing

(*Continued on page* 504b.)

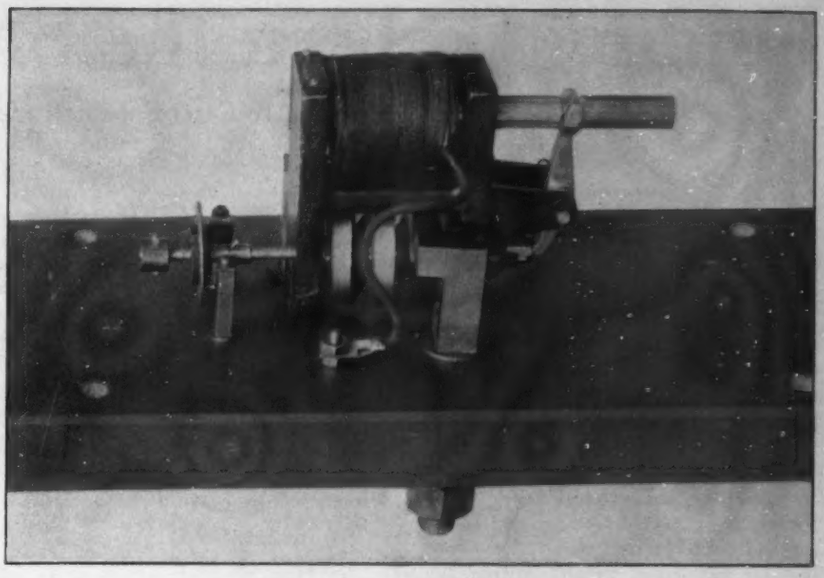


FIG. 9—PRIMARY SERIES RELAY

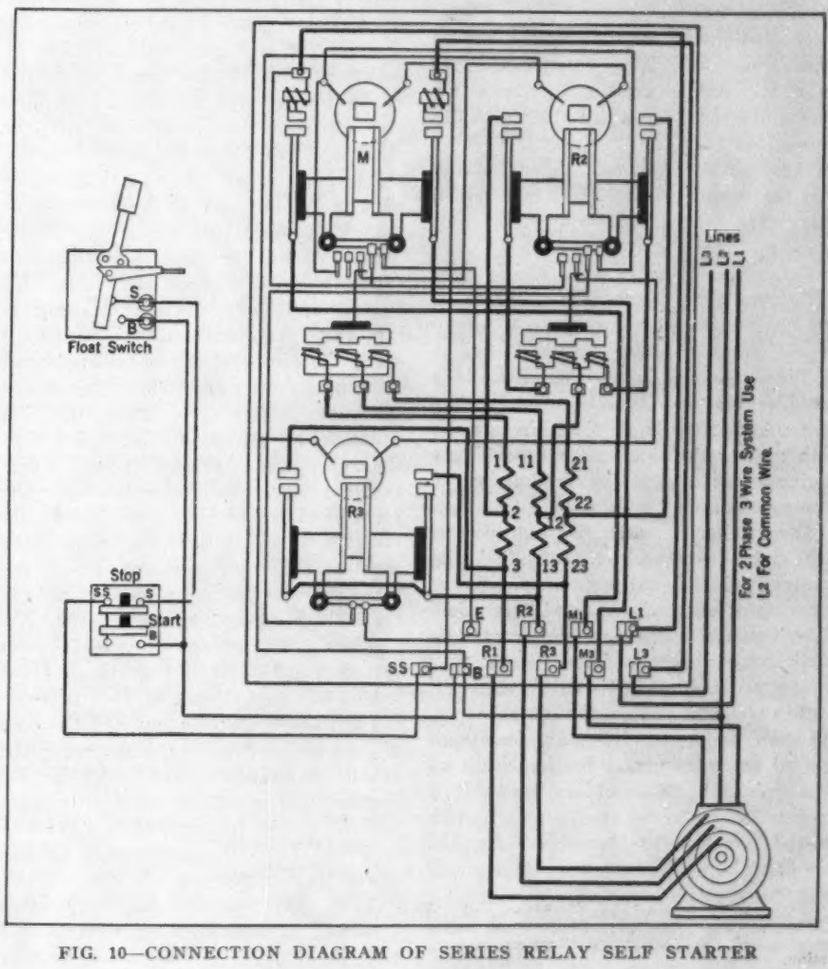


FIG. 10—CONNECTION DIAGRAM OF SERIES RELAY SELF STARTER

Finding Costs in the Steel Foundry

Common Sense and Fairness Are Essential Factors in Cost Determination —Overhead Charges Must Be Clearly Understood

BY G. MUNTZ

METHODS of determining costs in steel foundries are apparently as numerous as the foundries themselves. As long as the factor of individuality enters strongly into the problem, it is difficult to secure universal observation of definite rules and regulations for cost systems. It is only advisable to point out the general laws which broadly govern cost finding, and to let the individual foundryman formulate his own ways and means, within the scope of these laws. Lack of success may be generally attributed to a corresponding lack of common sense. A case in point is that of the old foundry which once gave a young office man, whose hobby was ultra-scientific management, free rain in the execution of his theories. The result was a fearful and wonderful crop of printed forms in all colors of the rainbow. Everyone in the foundry was supposed to fill out one or more of these gorgeous documents in the course of his day's business. Especially memorable was the yellow creation designed for the molders to set down the time consumed on each job.

Heinrich Schmidt was a good molder but no literary genius. His first yellow time card read as follows:

Job 25	2	hours
Job 28	½	hour
Job 30	1	hour
Job 31	2½	hours
Job 32	2	hours
Fillen der dem tiket	1	hour

There is no doubt that Schmidt's card represented exactly what he had done, but at the same time his German spirit of thoroughness unwittingly pointed out one of the weaknesses of the system.

In another instance a cost system was introduced, which embodied the newest principles of efficiency. Every operation was timed and recorded. For instance, when a molder wanted to nail up a mold, he had to estimate how many nails he wanted and then fill out a requisition on the storekeeper. If some nails were left, they were supposed to be returned to the credit of the job, but the molders made it a point to somehow use up all they asked for, to save themselves trouble. In this shop a laborer could not wheel sand from one place to another without a ticket; in fact, a study was made so that he would not come back with his wheelbarrow empty.

Many other examples could be given of freakish results with badly-contrived systems, and this is why I claim that first, last and always, hard-headed common sense must be exercised when endeavoring to determine costs in the steel foundry.

The Main Factor in Costs

One factor rules costs absolutely, and that is fairness. Costs must be fair both to the foundryman and to the customer, otherwise the latter will soon find a foundry that can make his castings at a better price; or else the foundryman will cheat himself and end in bankruptcy.

An example will bring out more clearly what this idea of fairness implies. Let us suppose that we are to make a plain block weighing 200 pounds. It will take half an hour to make this mold and once cast, the cleaning cost will be slight. If now we suppose that the same molder makes a rear housing for a motor truck, and that the casting again weighs 200 pounds we will notice at once that the time taken for molding will be about five hours, while considerable core making has been involved and very difficult cleaning is required. Anyone who has purchased many steel castings is acquainted with the smiling salesman, who, when asked to quote on a job, pulls out his schedule of prices and on being told the approximate weight, cheerfully announces a price either too high for the plain block of steel, or else ridiculously low for the rear axle housing. This illustrates a very common error, the estimation of selling prices on an exclusively per pound basis.

A scale for castings ranging between stated weights, or the quoting of flat prices per pound, unless similar work has already been produced and the conditions are well known, is generally the result of unknown costs. Either the foundryman is selling blindly, trusting to luck for his profit; or the purchaser is being charged such prices as will cover all emergencies.

The steel foundry, like any other business, is entitled to profits, and if the percentage is fair, the venture should thrive. Common sense indicates that the percentage must be based on cost. If the cost is fair, so will be the profit. Fairness is an absolute basis of such computation.

All the bugaboos of the foundry can be condensed in single word, "overhead." What is overhead, and how should it be distributed? Let us assume that we have incorporated a company for the manufacture of steel castings. We build and equip a plant, and by so doing, make an investment which will require interest. We have, therefore, created a charge which is absolutely independent of the business, but is not overhead unless we had to borrow the money necessary to build and equip the foundry. If the stockholders have subscribed sufficient funds to avoid borrowing, then dividends will take the place of interest if the venture succeeds.

The plant and machinery, however, will deteriorate, and depreciation must thus be reckoned with. Such an item is a fixed charge, an overhead, to be taken into account in costs. This gives us the first idea of overhead, namely, an unavoidable charge due to the very existence of the business. In other words, any charge incurred at the foundation of the enterprise, or any charge that must be taken care of whether operation obtains or whether all the wheels are at a standstill, is overhead.

While building the plant we finished organizing the company and elected officers. Through this simple process we again began paying out money in the shape of salaries, so that we are confronted by another unavoidable charge, more overhead. Salesmen, clerks, stenographers, superintendents, foremen, and many others are hired, resulting in more salaries and more overhead. The salesmen begin to travel; the manager inaugurates advertising; letterheads are printed, along with invoice blanks and other stationery; all resulting in traveling, advertising and office expenses, which represents still more overhead. All this happens before a wheel has turned, and if it is remembered that after the foundry is in full blast such expenses will continue on the same scale, we will be justified in calling these expenses general overhead.

We have now secured orders, and

From a paper read by G. Muntz, of the Tropenas Converter Co., New York, at a meeting of the Detroit Foundrymen's Association.

must hire molders. But as soon as we have done this, we find that all we have done is to acquire a new source of expense. Sand, gaggers, nails, facings, etc., are needed. One man must operate the crane, another must run the sand mill. Helpers to shovel the sand and run errands for the molders are required. More help is needed to shake out the molds and cut the sand, and sometimes, in the steel foundry, to pour the molds. When the castings are out of the sand, they must be brought to the cleaning floor, requiring still more work. Again, when the molder starts work, we must give him light; we must supply power for the sand mill and the crane; in the winter we must heat the foundry; the molds too, require drying. Another set of men are employed to make cores, necessitating the further purchase of sand, wire, iron rods, and other core-making paraphernalia. When the cores are set and the copes finally top the molds, clamps and wedges or adjustable bands or jackets must be provided.

It is, therefore, a matter of common sense to assume that as long as molding entails such a long list of expenditures, the latter could be considered as unavoidable charges due to molding, and constitute, therefore, a new set of charges which we may call overhead directly chargeable to molding.

The molder having done his work, the castings are brought to the cleaning floor. Before we can use the services of the shipping clerk, an entirely different organization is required, including men to clean the castings, helpers and possibly additional crane men. Chisels, hammers, wire brushes, emery wheels, saw blades, and a thousand and one other things must be purchased. A new unavoidable set of charges has been automatically created, and here we have overhead directly chargeable to cleaning.

Metal Cost

Before common sense can be applied to the apportioning of the various overhead charges, it is necessary to mention the very materials entering in the metal used to pour the castings. We must add to the cost of pig iron, scrap and ferro-alloys, such amounts of fuel as were used for melting and the cost of power and labor and lining material for furnaces and ladles. This total, divided by the number of pounds of liquid steel produced, gives us the cost price per pound of metal ready to pour.

To produce the steel, we need various raw materials which require the attention of almost the entire organization, both for purchasing and handling, but if we had done no molding, no metal would have been needed, although the general overhead would have been going on just the same. In all fairness, no general overhead can, therefore, be charged to metal. The melting department can be considered as a business within another business, delivering metal at cost to the molding department. Inasmuch as profits will be direct percentage of costs, the melting department will earn at the same rate as the other divisions.

Apportioning the Overhead

From what we know of molding, we may assume that the molders themselves are the only producers in their department, so that it would seem that all the overhead directly chargeable to molding must be apportioned according to the amount of the molders' payroll.

Let us see if common sense and fairness permit such proceeding. If a molder spends one hour on a mold, he will use a certain amount of unproductive labor and a certain amount of the materials which we claim to be directly chargeable to molding. It may be absolutely accurate, and it seems fair, to say that if the molder spends, two, three or four hours on a mold he will use two, three or four times as much of the items directly chargeable to molding as if he spent only one hour on the job. Therefore, if our payroll of molders amounts to $1,000 for a certain period, and during that time overhead directly chargeable to molding amounts to $1,500, then the overhead for molding will be 150 per cent.

We might reason in a similar way for cleaning and find that for a payroll of $500 for cleaners, who in this case represent productive labor, we spend $500 on overhead directly chargeable to cleaning, making the corresponding overhead 100 per cent.

As was explained before, general overhead cannot be charged to metal. Molding and cleaning must, therefore, bear the entire burden, because they are the only excuse for the expense; it is thus fair to pro-rate general overhead to the respective productive payrolls of molding and cleaning. Thus, if our general overhead were $1,500 the molding's share of the burden will be $1,000 and the cleaning's share $500. These burdens, added to the overheads directly chargeable to each department will bring the molding overhead to 250 per cent and that of the cleaning to 200 per cent.

Let us assume that we have to make a 100-pound casting. We will need 150 pounds of metal to pour it, but we will have to reckon on a return of 40 pounds of scrap in the shape of heads and gates. Also ten pounds will have been lost in the shuffle through spills, chipping, grinding, etc. For the purpose on hand we will assume the following data:

Metal costs, per pound	1.6c
Scrap, per pound	½c
Molders' wage, per hour	30c
Cleaners' wage, per hour	20c
Molding overhead, per cent	250
Cleaning overhead, per cent	200
Time spent on molding, hours	2
Time spent on cleaning, hours	½

Metal Cost

150 pounds at 1.6 cents per pound	$2.40
Less 40 pounds, return scrap at ½c per pound	.20
Actual metal cost	2.20

Molding Cost

2 hours at 30 cents	.60
Plus 250 per cent overhead	1.50
Total molding cost	2.10

Cleaning Cost

½ hour at 20 cents	.10
Plus 200 per cent overhead	.20
	.30
Total cost of casting	$4.60

This shows that all overhead should be charged proportionally to the amount actually spent on productive labor; and it requires no further explanation to comprehend that this is a fairer method than that of spreading the overhead on tonnage, whereby the man who has difficult castings to make is not charged enough, and the one who has easy castings must pay the difference. The further advantage of the method is that in the well regulated foundry the percentage of overhead directly chargeable to molding or cleaning is almost constant, so that extensive variations in costs can only be expected from the metal itself, its materials fluctuating in cost.

Determining Selling Prices

It would seem that from costs to selling prices there is only one step, but we find in actual practice that this is not so. It is one thing to know exactly what a casting costs, but a vastly different matter to add what is claimed as a fair profit and declare that the price at which the casting will sell has been determined. What has really been established is the figure at which the castings should sell—at the time of making the estimate. The reason for this anomaly is quite simple, and lies in the fact tnat general overhead remains the same, whether business is slack or booming.

In all fairness, customers cannot be charged for the entire general overhead when the plant is running only at 50 per cent capacity, even if so far as general overhead is concerned, no decrease has been effected. A certain amount of general overhead will allow the handling of a well defined molders' payroll. If the latter decreases, the general overhead does not change materially, but for estimating purposes it

should be assumed that a pro rata decrease has taken place, with the result that selling prices will remain fair.

Assuming that the percentage of overhead chargeable to each department has been determined, an estimate will resemble the detailed cost already outlined, and the selling price will be obtained by simply adding such profit as is considered fair.

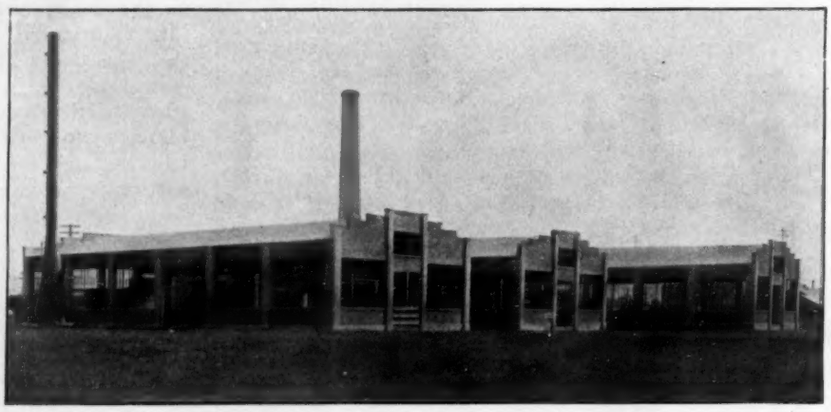
The direct application of common sense to the determination of costs in the steel foundry shows that it is impossible to know exactly how many nails or chaplets have been used on a certain job, or just how much power sand, facings and general improductive labor should be charged. The method outlined is based on fairness and should consequently require but a minimum of brain work. Whenever a new item of expense creeps up, it is apportioned to whichever department has caused it. A further advantage is that productive labor need not be limited to molding and cleaning. Additional divisions can be created, covering, for instance, core making, annealing and other operations. No definite way of applying this method has been set forth for two reasons; first, to allow full sway to individuality; second, because in the steel foundry no two cases are alike; but necessitate individual diagnosis and treatment. In the first case, the limits are only those of each individual's ingenuity and imagination; in the second, special conditions must be met through adequate means. As an instance, pouring gangs are used in the large steel foundries. Their labor is by no means proportional to the time spent by the molders on the molds they are pouring. It is simply a case of tonnage, so that metal is figured, not in the ladle, but at the mold, it being considered that metal costs what it did in the previous case, plus the pouring gang's payroll.

I have refrained from considering bad castings, because this is one item which admits of no rule whatsoever. There is no such thing, in the light of fairness, as an average percentage of loss on steel castings. Common sense and experience are the only guides to the solution of this riddle. I would suggest that in making estimates each particular case be treated as a unit and that the foreman's own judgment be taken as to how many castings will have to be molded and poured to secure the required number. In such a case, the costs must be determined, not on each single casting, but on the lot under consideration.

It might be well to point out the one weakness of the system, namely, the difficulty in obtaining the cleaning cost and also the coremaking cost, when such further subdivision is found advisable. Where piece work obtains, the system works like a charm, but where castings are cleaned by day workers, it is almost impossible to ascertain how much time was spent on cleaning any particular one. The same can be said for cores, when using coremakers paid by the day. We have found that in such cases it is perhaps not quite accurate, but absolutely fair, to include cleaning, fettling and coremaking in the overhead directly chargeable to molding, and to establish costs which have but one coefficient. Another difficulty is the lack of elasticity of any cost system, to cope with new developments in the art of steel founding. We find, for instance, that annealing is no more a plain staple process, but an actual heat treatment. Even then, we do not stop at heat treating, but quench the castings, to insure crystalline structures for the various purposes intended. How shall we charge overhead on such new items? Tonnage cannot be considered, because castings of the same weight will almost invariably assume different bulks, although requiring about the same amount of fuel for heat treatment. It is, therefore, a question of furnace space, and from this we deduct that whatever overhead is chargeable to this new department, should be apportioned on the basis of volume.

Knowledge of costs in the steel foundry permits perfect control of all operations involved, and such control

(*Continued on page* 504b.)



THREE BUILDINGS CONSTRUCTED ON THE BARR SYSTEM FOR THE ELECTRIC MATERIALS CO., NORTH EAST, PA.

Economical Industrial Buildings

The accompanying illustration shows three buildings recently completed for the Electric Materials Co., North East, Pa., manufacturer of electric brass and copper products. The buildings were constructed according to designs furnished by H. Edsil Barr, Erie, Pa. The entire plant consists of four buildings, a foundry, forge shop and machine shop shown in the illustration, and a power house in the rear, where it is not visible. The foundry and forge shops are each 40 x 90 feet and the machine shop is 35 x 120 feet. All of the buildings are 14 feet high to the eaves and are connected by a passageway having a cross-section of 12 x 20 feet. The power house is 22 x 66 feet with a fire wall between the engine and boiler rooms.

The buildings have concrete foundations, the frames, according to the Barr system, consisting of H-beam columns built into hollow brick pilasters, which are subsequently filled with concrete forming a solid monolith said to have exceptional strength and rigidity. The window sash are steel. Special attention is given to ventilation, which is ample for all possible working conditions. It is said, however, that the buildings are not difficult to heat.

The floors are concrete laid on tamped cinder fill. The roofs consist of 1¼-inch matched yellow pine strips nailed to 2 x 6-inch pieces, which are bolted to the steel purlins; the latter are spaced on 5-foot centers. When provided with a sprinkler system, this roof is said to be practically fireproof.

The cost of the buildings was moderate. Including the power house, but exclusive of the stack, plumbing and machinery, the cost of the four structures is said to have been inside of $15,000.

Twist drills stand more stress in proportion to their size and weight than almost any other tool. When a drill gives trouble it is fairly safe to assume that some of the conditions are wrong. Don't jump at the conclusion that it is necessarily the fault of the drill maker.

War Upsets Manganese Ore Industry

Interesting Details of the Abnormal Situation Now Prevailing Are Given in Bulletin Issued by United States Geological Survey

IN VIEW of the unusual condition that has been precipitated in the ferro-manganese market by the war, and of the increased efforts toward domestic production in this country, a bulletin on the production of manganese and manganiferous ores in the United States in 1914 by D. F. Hewett, recently issued by the United States geological survey, is of considerable interest.

The small extent of the deposits of manganese ore in the United States is illustrated by the production of only 2,635 tons in 1914, representing a decline of 1,413 tons from the production of 1913. The output last year, however, is about equal to the average for the five years preceding, which was 2,394 tons. The production of all grades of manganiferous ores in 1914 was 445,827 tons, of which 60,414 tons contained more than 15 per cent of manganese and was used in the manufacture of low grade ferro-manganese and manganiferous pig iron. The production of such ore in 1913 was 672,146 tons, of which 35,850 tons contained more than 15 per cent manganese. Imports of manganese ore in 1914 were 283,294 tons, compared with 345,090 tons in 1913, a decline of 61,796 tons. Russian imports were only about 40 per cent of those of the preceding year, because of the closing of the Dardanelles and imports from India were reduced about 30 per cent. The increased shipments from Brazil partially offset this decline. Imports of manganese ore to the United States and the principal countries from which they were derived, over a term of years, are given in Table II. Discussing the developments in the manganese ore situation in 1914, in which the subject of mining with respect to the market in this country, is reviewed, Mr. Hewett says: "The outbreak of the European war has greatly disturbed the manganese ore industry and that of the manufacture of ferro-manganese. These, as well as a number of other mineral industries, have been suddenly compelled to adopt new sources of materials that are in many cases uniquely adapted to special uses.

Table I.

DOMESTIC PRODUCTION OF MANGANESE ORE.

	Total.	From Virginia.
1914	2,635	1,724
1913	4,048	4,048
1912	1,664	1,664
1911	2,457	2,457
1910	2,258	2,258
1909	1,544	1,544
1908	6,144	6,144
1907	5,604	4,604
1906	6,921	6,028
1905	4,118	3,947

In order to understand the character of this adjustment it is desirable to review briefly the manganese-ore industry since the beginning of the modern steel industry from 1865 to 1870, when the development of the bessemer and open-hearth processes created a demand for carbon-bearing manganese alloys. Although complete statistics are not available for the period from 1870 to 1880, it appears that the ores needed for this use were derived about equally from domestic and foreign deposits and that there was a period from 1884 to 1890 when the domestic production possibly exceeded the imports. During this period the mines of Virginia furnished more than one-half the domestic supply. Since 1888, however, there has been a tendency toward the steady decline of the domestic production, except during several short periods when activity among the mines of Georgia and Arkansas served to augment the product of the Virginia mines. At the same time the imports have considerably increased, and these rather than the domestic output have responded to the changing conditions in the steel industry.

From 1890 to 1898, many countries contributed to the imports, notably Russia, Turkey, Chile and Cuba. The deposits of the Caucasus region, though known in 1848, did not begin to export ore until 1879. The statistics showing the extent to which these ores were imported by the United States prior to 1893 are not available. Manganese ore was first exported from India in 1892, and the exports have risen from 674 tons in that year to the enormous figure of 637,444 tons in 1912. According to Branner, manganese ore was first exported from Brazil in 1894, and although from 1895 to 1902 the United States received about half of the quantity exported, during the last few years a much smaller portion has been received, and the imports from India have been greater than those from any other country. The decline in the output of domestic mines has without doubt been due both to the exhaustion of known deposits as well as to their inability to compete with foreign sources at prevalent prices. The most important reason why the ores from India, Russia and Brazil have so largely displaced domestic ores, in spite of the great distances that they are transported, lies in the character of the deposits.

(*Continued on page 504b.*)

Table II.

IMPORTS OF MANGANESE ORE FOR TEN YEARS

Year.	Total Imports, Tons.	From Russia, Tons.	From British India, Tons.	From Brazil, Tons.
1914	283,294	52,680	103,583	113,924
1913	345,090	124,337	141,587	70,200
1912	300,661	83,334	128,645	81,580
1911	176,852	19,103	106,580	41,600
1910	242,348	33,120	140,965	53,750
1909	212,765	14,486	115,140	35,600
1908	178,203	250	142,813	17,150
1907	209,021	1,000	95,300	52,922
1906	221,200	13,805	154,180	30,260
1905	257,033	24,650	101,030	114,670

Table III.

CONSUMPTION OF FERRO-MANGANESE AND SPIEGELEISEN

	Ferro-Manganese.		Spiegeleisen.	
	Domestic output.	Imports.	Domestic output.	Imports.
1914	100,731	82,997	76,625	2,870
1913	119,495	128,070	106,980	77
1912	125,378	99,137	102,561	1,015
1911	74,602	80,263	104,013	20,870
1910	71,376	114,228	153,055	25,383
1909	82,209	88,934	142,831	16,921
1908	40,642	44,624	111,376	4,579
1907	55,918	87,400	283,430	48,994
1906	55,520	84,359	244,980	103,268
1905	62,186	52,841	227,797	55,457

A Study of Bog Iron Ore Deposits

The Swamps of Glaciated Regions Concentrate Iron-Bearing Waters Until the Mineral is Deposited in Layers

BY C. L. DAKE

IRON is much more soluble in the ferrous than in the ferric form. Where, as in the case of the ferrous silicates and the sulphides, the iron is already in the ferrous form, it may go at once into solution and be removed, upon the breaking down of the parent rock. If in the ferric form, it must first be reduced, usually by the decay of organic matter, the demand of the decaying carbonaceous matter for oxygen being so great that the latter is abstracted from the ferric compounds and the iron is thereby reduced and rendered soluble. The simplest cause of precipitation of iron is oxidation from the soluble ferrous to the much less soluble ferric compounds. There are many other means by which, under special conditions, iron may be precipitated in nature. Oxidation, evaporation of carbon dioxide and iron bacteria have been usually held to be most important.

Character and Distribution of Bog Ores

Bogs are often accompanied by thin layers of iron ore, consisting largely of hydrated ferric oxide, frequently with considerable amounts of ferrous carbonate, and sometimes ferrous sulphate and silicate. In marine marshes, under the influence of the sulphates of sea water, iron may go down as the sulphide. Bog ores, however, consist essentially of limonite, with subordinate amounts of carbonate. Such ores are usually high in phosphorus and almost invariably preserve abundant fossil fragments of leaf and plant remains, which serve to identify them as of bog origin.

Those countries best known as producers of bog ores are Norway, Sweden, Germany, Poland, Finland and Canada. Many deposits occur in the northern United States. A few localities are known in regions farther south, among them the deposits of Missouri, North Carolina and Rio Tinto, Spain. Exhaustive lists of bog ore districts, however, include few localities outside the limits of the regions just named. Careful examination has shown that the overwhelmingly larger number of the known bog deposits occur in the northern portions of the three northern continents. A very small percentage of the bog-ore deposits is to be found outside the glaciated regions, while within those regions they are characteristic and abundant, both in Europe and in North America. The ores accumulate in the smaller swamps, while in large neighboring morasses they may be entirely wanting, probably by reason of the fact that the concentration is greater in the smaller swamps. Glaciated areas are more favorable to iron accumulation, because they present numerous small swamps, rather than the immense ones, such as are common to the lower flood plains and deltas of large rivers, or the saline marshes of low coastal plains.

Another factor, doubtless, is the proximity of available sources of supply for the iron. From 1 to 3 per cent of the glacial drift is said to be made up of magnetite, and other iron compounds are present. The unconsolidated condition of the drift renders this iron content easily accessible. The glaciated regions parallel somewhat closely the so-called "Pre-Cambrian shields" of both Europe and North America, areas in which enormous amounts of older iron-rich rocks are localized. This may also account in part for the noteworthy supply of iron for bog deposits in both drift and bed rock of the glaciated regions.

Of the localities of bog ores cited outside the glaciated area, three at least are definitely related to local sources of iron. In the case of the Rio Tinto beds, a marsh or shallow lake extended over the area where the bog ores are now found, and into this flowed iron solutions resulting from the decomposition of extensive beds of pyrites. From these chalybeate waters, the bog ores were, and are still, thrown down. In Park county, Colo., water which percolates through the rock is charged with iron sulphate, resulting from the solution of beds of pyrites in the vicinity. The iron is thrown down in a small marsh, through which the drainage of the region passes. In the Missouri deposits, a very ferruginous sandstone is underlaid by an impervious shale. Bogs form along the contact where the percolating waters escape, and here the ores are deposited. From the above three cases, it will be seen that an immediate source of iron may become one of the factors in localizing such deposits.

The prevailing red color of soils in the tropics has been assumed to be a result of a higher oxidation of the iron and its superficial dehydration. It seems possible that the rapid decay of vegetation in tropical regions, and the resulting lack of accumulation of partly decayed vegetable matter, may effect the accumulation of bog iron ores. Two alternative suggestions have been tentatively advanced: first, that iron does not go into solution in the tropics as abundantly as in colder regions; and secondly, that it goes into solution abundantly, but is not as readily precipitated.

In only a few analyses of tropical waters have separate determinations of ferric oxide and aluminum trioxide been made. They are as follows, with a comparison of temperate zone rivers:

Analysis of Tropical River Waters.

River.	Fe_2O_3 Parts per Million.	Total Salinity Parts per Million.
Plata	4.0131	91
Parana	3.1458	98
Nile	3.1535	119

Analysis of Temperate River Waters for Comparison.

Mississippi	0.2158	166
St. Lawrence	0.0804	134
Danube	0.3340	167

The three tropical rivers in the above list are trunk streams, from which the water was taken, well down toward the mouth. As will be noted, they run far higher in iron than the three streams in temperate regions cited for comparison. The analyses given are too few in number to warrant the positive statement that tropical rivers in general carry a high iron content; but the figures are suggestive.

Distribution of Bog Ores

Bog ores are widely distributed, but occur chiefly within the colder temperate regions, and for the most part within the glaciated area. No important deposits are known to be forming in marine bogs. The probable causes of this distribution are as follows:

Swamps are more numerous in the glaciated area than elsewhere; glacial swamps are smaller and allow greater concentration of chalybeate waters; there is abundant available iron in glacial soils; climate factors possibly involve the high state of oxidation of the iron in warmer regions, together with the lack of iron solvents in large areas of tropical soils, the abundant organic matter in many of the rivers keeping in solution the iron once dissolved and permitting it to be carried out to sea, instead of being redeposited in swamps.

From a paper to be read at the September meeting of the American Institute of Mining Engineers, San Francisco. The author, C. L. Dake, is assistant professor of geology, Missouri School of Mines.

Fig. 1—General View of the Carborundum Co.'s Exhibit

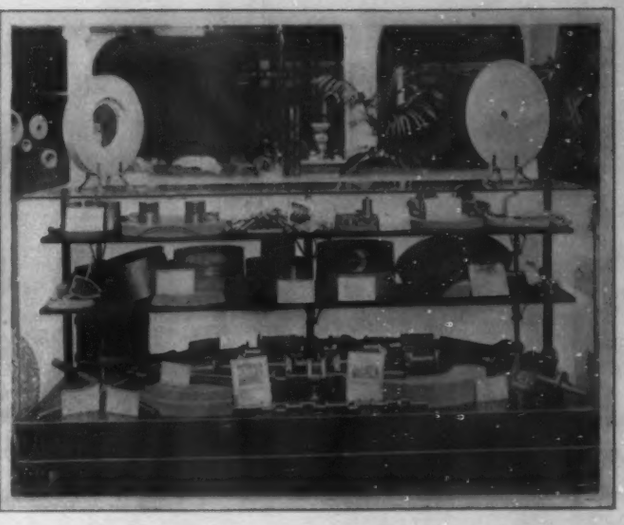


Fig. 2—A Typical Display Case in the Carborundum Exhibit

Exhibits Abrasive Products at Fair

Carborundum Co.'s Display in Machinery Palace Reveals Important Part Played by Grinding Wheel in Modern Industry

VISITORS to the Panama-Pacific exposition, and particularly to the machinery palace, have commented on the contrast between the commercial exhibits of today and the methods of display in vogue among manufacturers a score of years ago. Where once it was thought sufficient to heap together a jumbled and unattractive mass of products with little eye to harmonious outline, color or decorative values, the present-day industrial exhibit is the result of study and taste. The interest of the public has increased correspondingly.

An example of what may be developed in the way of a pleasing and instructive display of industrial products is found in the exhibit of the Carborundum Co., Niagara Falls, N. Y., in the machinery palace at the exposition. The idea of the designers of this exhibit was to illustrate the uses of abrasives by means of a varied collection of materials and products. This collection includes useful and decorative materials and products, ranging from toothpicks to flooring, from flour mill rolls to needles, from steel shafts to watch dials, from semi-precious stones to malleable castings. In each case the particular Carborundum Co. product which did the work of grinding is also shown. Of interest to those identified with the machinery trade is the exhibit of surface, internal and cylindrical grinding samples, shells, mill rolls, and other articles. The immense grinding wheel in the display is said to be the largest solid vitrified wheel ever made, and is 78 inches in diameter and 8 inches thick, weighing 2,500 pounds.

To show the hundreds of products, a space of about 1,400 square feet was necessary. In the center of the exhibit is a fountain, shown in Fig 1, built of irregular masses of the iridescent abrasive crystals, over which water splashes into a marble basin, the coping for which was molded with carborundum wheels. The fountain is 12 feet high.

FIG. 3—BIGGEST IN THE WORLD

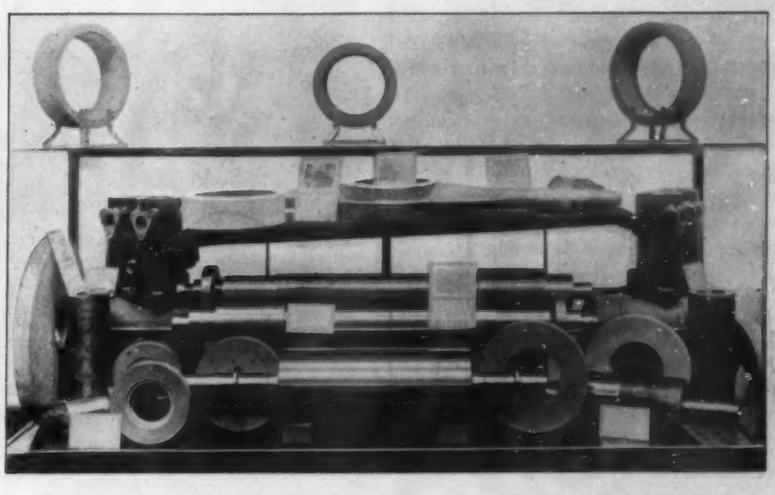


FIG. 4—DISPLAY CASE, SHOWING ARTICLES IN THE MANUFACTURE OF WHICH CARBORUNDUM PRODUCTS WERE USED

How to Keep Men in Your Employ

An Analysis of the Cost of Hiring Men—Successful Methods Pursued by Jeffrey Mfg. Co. in Maintaining Its Working Force Practically Intact

BY W. A. GRIEVES

IF YOU are a manufacturer employing 2,200 men and are shown that it costs you, on an average, about $88,000 more each year than it should, to maintain this force, you are at once interested. At the Jeffrey plant, methods have been adopted for meeting this problem with favorable results and the principles that have been applied can be adapted to other concerns.

Thinking our experience might be abnormal, we sent letters to 40 manufacturing concerns, in the middle west. This letter told how we had been able in five years, by adopting different methods, to reduce the cost of maintaining our force by $24,000 per year.

Fifty per cent, 20 firms, replied and gave their experience for the past year. Others wrote that their experience had been so bad, they felt diffident in putting it upon paper. The replies of the 20 firms, revealed that to keep an average force of 44,000 men at work, during the year, they had employed 69,000 men.

Why Men Quit

If more care and thought were exerted to find out why men quit their jobs so frequently, this condition could be improved, and there would be a larger balance on the credit side of the ledger at the end of the year. A certain percentage of any force will change, including loss by death, 1 per cent; by sickness, 5 per cent; through removal, 10 per cent and through mistakes in selecting the right man for the right place, 25 per cent. To maintain an average working force of 44,000 men, taking the foregoing percentages, only 18,000 should have been hired. Instead, 69,000 were hired, or 51,000 more than can be accounted for.

To arrive at the financial loss, group the employes into the following classes:

1.—Highly skilled mechanics.
2.—Semi-skilled mechanics.
3.—Helpers and handy men.
4.—Laborers.
5.—Clerks.

Then distribute the cost as follows:

1.—Expense of employing.
2.—Time loss in giving instructions.
3.—Breakage of tools and machinery by new men.
4.—Spoiled work.
5.—Decreased production.

A paper read before the Detroit Board of Commerce. The author, W. A. Grieves, is assistant secretary and supervisor of welfare, Jeffrey Mfg. Co., Columbus, O.

Analyzing these five divisions, their cost in dollars is secured. The clerical work in hiring and discharging men is the least expensive. This cost can be placed very conservatively at 50 cents per man. The instruction expense depends largely upon the nature of the work and the skill and experience of the new employe. The unskilled laborer will cost from $1 to $2 each for instruction. Experiments in our machine shops show that $10 is not too high for the average skilled mechanic. It is reasonable to figure the expense for semi-skilled men at one and a half time this amount. Helpers and handy men will require at least $5 for instruction; while training new clerks will add a few more dollars. Experience shows that the total cost of instruction can be conservatively placed at $20 per man.

Each of 20 firms employing an average of 2,200 men, found the cost of maintaining its working forces for a year, was $88,000 too high, a combined loss of $1,760,000. The loss was due to the hiring of 69,000 men to keep an average of 44,000 employed. Mr. Grieves in this article explains how the Jeffrey Mfg. Co. has escaped this loss by educating the workmen, and stimulating their interest through co-operation.

The cost of increased wear and tear and damage done to tools and machinery is difficult to determine, but is about $1 for the highly skilled mechanic and from $7 to $10 for helpers and handy men, an average of $7.

Loss due to reduced production is undoubtedly the largest item. Our experience has been, that mechanics after six months in our employ will gain an average of three to five hours' time per day, while the average new mechanic takes from one month to three months to be able to meet the time limits. At the average wage of 35 cents per hour, the old men gain four hours per day. At 50 per cent of the day rate, the gain is 70 cents per day. As these men have also saved a like amount for the company, in one month of 24 working days, the company loses $16.80 per man. If the average period during which time is lost by the new men is placed at two months, the loss totals $33.60 per man for decreased production.

The expense incident to spoiled work also is hard to get at, but is at least $15 for skilled and semi-skilled mechanics and $5 for handy men and helpers.

These losses total $81.10 per man. To be conservative, reduce this to $40 per man average. For each of the 20 firms, averaging their employes at 2,200 men each, this means $88,000 of unnecessary expense, or $1,760,000 for all of them. And we have not counted the increased overhead. These figures clearly indicate the need of greater stability of employment in our industrial institutions.

Salesmen vs. Workmen

Industry is composed of two major divisions, producing and selling. What has been your attitude toward the inefficient salesman? In some cases you discharge him. Generally you are no better off. In replacing him, you take the same chances of getting one just as inefficient. Therefore, you reason that the best solution is to educate the salesman. Why not do the same in the manufacturing departments?

The first plan of attack should be through education. The better educated a man is, the more ground for believing that he can be reasoned with. As an example, while conversing with one of our best paid and highly skilled mechanics, recently, he remarked that the company must make an enormous profit on a certain product. Material and labor costs were the only two elements he had considered. Of the immense overhead burden, such as sales, expense, supervision, upkeep, insurance, interest on investment, advertising, etc., he was entirely ignorant.

Is it any wonder that such men fall easy victims to the misleading arguments of the selfish and unprincipled labor agitator? The trouble rests with the manufacturers. They have allowed themselves to be advertised by those who do not know—allowed themselves to be shown wrong side up.

Do your men know that if you make money this year, it probably will go into new machinery and equipment next year? Do they know that through changes in design, this new machinery may be good only for the scrap heap next year? Do they know that during periods of depressed business, you are compelled to take work below cost, simply to give them work and hold your organization together? Do your

men know that while you are eager to pay higher wages, provide better equipment, and have more ideal working conditions, you are restrained by competition? You may be willing to pay $5 per day to mechanics, but others may pay only $3 per day. Do your employes know this?

In the Jeffrey betterment policy, we have avoided all suggestion of paternalistic motives. The work has been from the men to the company, not from the company to the men. If anything new is to be introduced, we get hold of the leaders—those men whose intelligence is most developed. Having gained their favor, the less thoughtful will fall in line.

Importance of the Foreman

In our organization, we have paid particular attention to selecting the foremen. You cannot have an unintelligent head of a department, and expect the men to be up to standard. In hiring men, a well defined policy is adopted. This policy is known to the heads of departments and thoroughly understood in the employment office. It requires certain standards and no man is sent to a department who does not fulfill these requirements. The rest lies with the foreman.

Employes are encouraged to work out their own problems, and are largely instrumental in developing the conditions under which they work. As an example, a mutual aid association was organized 20 years ago, but for 15 years it was a failure. The officers were company officials and the men showed little interest. Each year there was a deficit which the company had to meet. The promise to pay half the dues, did not induce the men to join.

The association was reorganized and its success or failure put up to the men themselves. A new management was elected. At the end of the first year, the membership had increased more than 300 per cent, and $2,000 were in the treasury. The record has been maintained each year.

The Restaurant

The next feature was a restaurant. At the suggestion of the men, a small lunch counter was established about five years ago. It was well patronized and in a few months was moved to larger quarters. It has been moved to larger quarters on three different occasions. We now have a completely equipped restaurant serving 600 daily, and this will be doubled shortly.

Everything sells for three cents, except meat, which is four cents. Nevertheless, we have saved enough to pay for the equipment for which the

(*Continued on page* 504c.)

Efficiency of Blooming Mills

BY CHARLES L. KUDERER

IN ORDER to determine the relative rolling efficiency of various types of blooming mills, the writer has originated a set of formulas, for which absolute correctness is not guaranteed. He does claim, however, that they are original and represent within reasonable limits the rolling efficiency of blooming mills. The mills shown in the accompanying illustration are exclusively blooming mills, the tables not being equipped with the necessary manipulator for edging up slabs of any considerable width. Mill No. 1 rolls practically all sizes of blooms from an ingot 22 x 25 inches down to 4 x 4-inch billets. Mill No. 2 works in conjunction with a 28-inch three-high billet mill, for which it supplies all the steel. Mill No. 3 furnishes all the steel for the 10-inch stands of a 14-inch continuous billet mill. These mills run at such widely varying speeds that the respective revolutions per minute cannot be determined, probably never exceeding 9 feet per second in rolling.

The formulas are as follows:

$$\text{Elongation ratio} = \frac{\text{Cross section of ingot}}{\text{Cross sect. of finished bloom or billet}}$$

$$\text{Length of bloom or billet} = \frac{\text{Length of ingot} \times \text{elongation ratio}}{\text{Average elongation per pass}}$$

$$\text{Average elongation per pass} = \frac{\text{Length of bloom or billet}}{\text{Number of passes}}$$

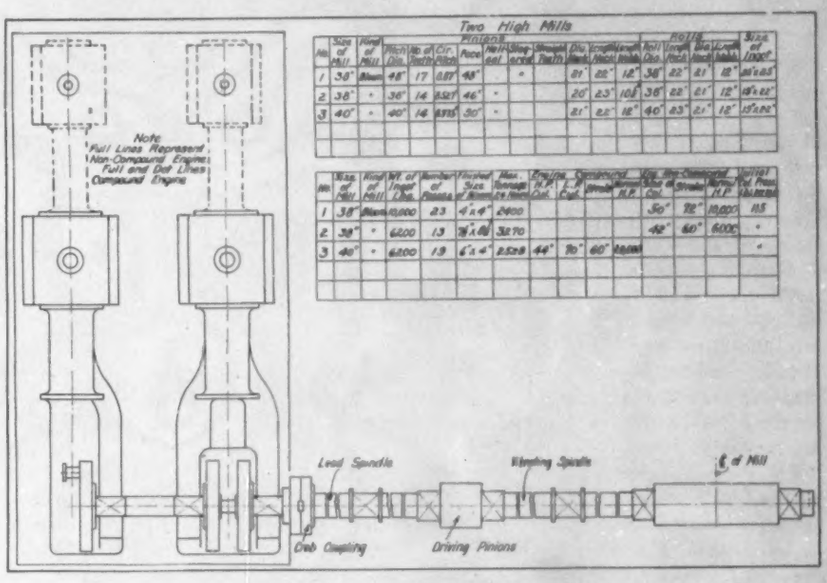
$$\text{Elongation foot tons} = \text{Tons rolled by mill in 24 hours} \times \text{average elongation per pass.}$$

$$\text{Power factor} = \frac{33{,}000 \times \text{horsepower of engine} \times \text{pounds of steam per horsepower}}{\text{Elongation foot tons} \times 2{,}000}$$

Omitting the calculations and tabulating the results we have:

Mill No.	Elongation ratio.	Length of ingot, feet.	Length of bloom or billet, feet.	Average elongation per pass, feet.	Elongation foot tons.	Power factor.	Efficiency, per cent.
1	34.3 to 1	5.41	185.5	8.0	19,200	239	100
2	6.9 to 1	4.4	30.0	2.3	7,521	348	66
3	17.4 to 1	4.4	76.5	4.0	10,112	554	43

The relative efficiency of mills Nos. 2 and 3 was determined by assuming the efficiency of mill No. 1 as 100 per cent.



DETAILS OF BLOOMING MILLS

The power factor is derived as follows: 33,000 × horsepower × pounds of steam consumed per horsepower per hour, represents units of work done by the engine, and in this case the writer assumed 27 pounds per horsepower per hour for non-compound and 17 pounds for compound condensing engines. The number of hours the engine is working has not been considered as it makes no difference in the relative efficiency of the mills, although it may change the power factor more or less. For example, in reducing the tonnage of the mills to one hour instead of 24 hours, we have:

Mill No. 1. Power factor = 33,000 × 10,000 × 27 ÷ 100 × 8 × 2,000 = 5,600.
Mill No. 2. Power factor = 33,000 × 6,000 × 27 ÷ 136 × 2.3 × 2,000 = 8,540.
Mill No. 3. Power factor = 33,000 × 20,000 × 17 ÷ 105 × 4 × 2,000 = 14,300.

Assuming mill No. 1 to represent 100 per cent the relative efficiency of mill No. 2 is about 65 per cent and of mill No. 3 about 40 per cent.

Modern Electrical Welding Practice

Science of This Work is Discussed and Suggestions Included Governing Its Use in Casting Manufacture

BY JOHN A. RANDOLPH

THE science of welding dates back to ancient times. The primitive method, using hammer, anvil and forge, however, is extremely limited in its scope, and is not practicable for mending cracks or joining seams, for work on large castings, or for any of the heavier forms of welding where the contour and dimensions of the piece must be maintained. For work of this character, the more modern methods employing the oxy-acetylene gas flame or electricity are used. In the gas and electrical methods the contiguous pieces of metal are heated to the melting point and then fused together. To increase the strength, homogeneity and efficiency of the weld, a filler of outside metal is usually melted and fused into the joint. In electric welding, two general processes, the resistance and arc methods, are followed. This article will treat of the arc method.

Three processes are followed in arc welding. Each offers distinct advantages for certain classes of work. In each case, the metal is heated to the required temperature by an arc drawn between two electrodes. Direct current is used in all cases, alternating current not being suitable for arc welding. In the Bernardos process, which is widely used, the work to be welded furnishes one terminal for the arc. The other electrode is formed by a piece of carbon or graphite arranged so as to be readily movable. The positive side of the circuit is connected to the work, for two reasons, first, because that side of the arc is generally 75 per cent hotter than the negative, and second, because a large number of carbon particles would be carried into the weld if the carbon were made the positive electrode. This deposit of carbon particles would result in excessive hardening of the metal. In the Slavianoff process, the work comprises one electrode, as in the Bernardos method. The other electrode, however, consists of a piece of filler metal. The action of the arc softens the metal of the movable electrode and causes a small quantity to be carried into the weld, adding homogeneity to the joint. Owing to the absence of carbon, the metal of a weld made by this process always remains sufficiently soft for machining or hand-working. This method is used for overhead welding in fire boxes, tanks and other situations where it would be difficult to run in the filler metal by hand.

In the Zerener process, both electrodes are entirely independent of the work to be welded. They are of carbon and are arranged in the form of a V. The arc passing between the two carbons is forced into the work by the field of an electro magnet. The arc acts like a flame upon the work. Any direct current source of supply can be used for arc welding, providing the voltage is high enough. The pressure on the circuits used for light and power is generally 110 or 220 volts. This is much higher than is necessary for welding, the pressure required for this purpose being normally not more than 50 volts. If an electrical circuit of standard voltage is to be used directly for welding, a series resistance must be placed in the welding circuit to reduce the voltage. This results in an excessive loss of power through heating the resistance.

To reduce resistance losses to a minimum where a standard voltage supply is used, an indirect method is

STRENGTH OF ARC WELDED JOINTS

Samples and preparation.	Breaking strain, pounds.	Efficiency of joint, original piece = 100.	Nature of breakage.
Original piece of steel plate.....	58,600	100.00	Near end of piece
Lap joint, arc welded.....	54,800	93.52	Outside weld
Lap joint riveted and welded.....	54,200	92.50	Outside joint
Butted joint, arc welded.....	47,800	81.57	Through weld
Lap joint riveted only.....	35,000	59.72	In rivet holes

For the illustrations accompanying this article we are indebted to the General Electric Co., Schenectady, N. Y.

FIG. 1—GEAR CASE WITH BROKEN SUSPENSION LUG

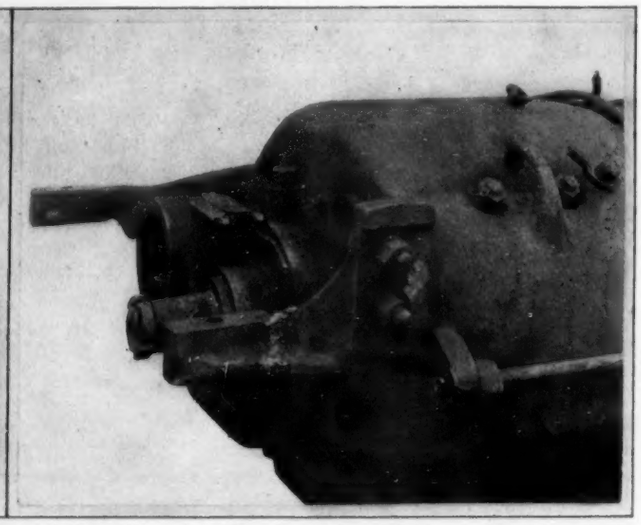
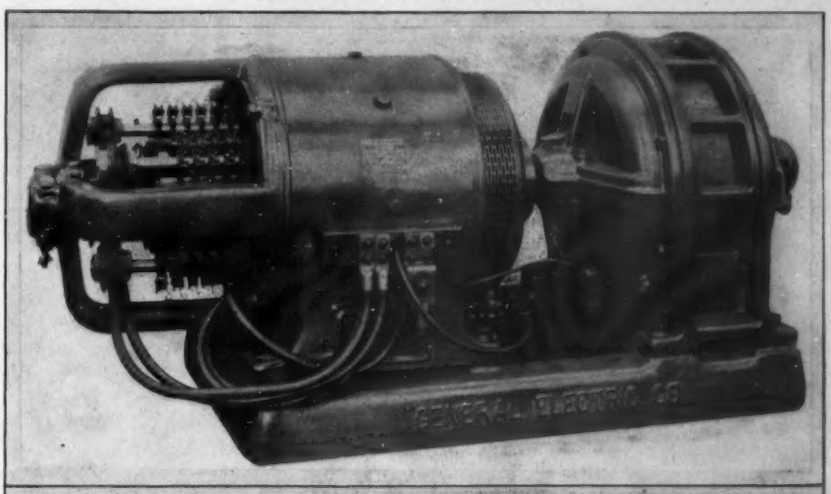


FIG. 2—SUSPENSION LUG REPAIRED WITH ELECTRIC ARC

employed, in which the motor generator is interposed between the supply circuit and the weld. The motor is connected directly to the supply source, the generator being wound to produce current with the range of voltage required at the arc. The pressure is varied by regulating the field excitation of the generator. Lower voltage is thus secured with no material loss between the supply source and the weld. Either an alternating or a direct current circuit can be used for driving the motor generator, by simply using an alternating or direct current type of motor, as required. By the use of a switchboard and bus bars, any number of independent welding circuits can be fed at the same time. This enables an unlimited number of operators to work from the same generating equipment. With the electric arc, it is claimed that 18 feet of seam can be welded in an hour at a total cost of 90 cents, or 5 cents a foot. The welding of plates, ½-inch thick, by an electric arc costs 15 cents a foot; with plates an inch thick the cost is 35 cents per foot. The results of a series of tests on riveted, arc welded joints, as published in *The Boiler Maker*, February, 1915, are shown in the accompanying table. Electric arc welding is widely used in foundries, machine shops and steel-working plants. It is especially valuable for mending cracked shafts, broken castings, cracked lugs, and the like. It is also used extensively for cutting purposes. In railroad shops, the arc welding process has proved of service in mending flues, fire boxes, frames, and for the restoration of material that has been worn away.



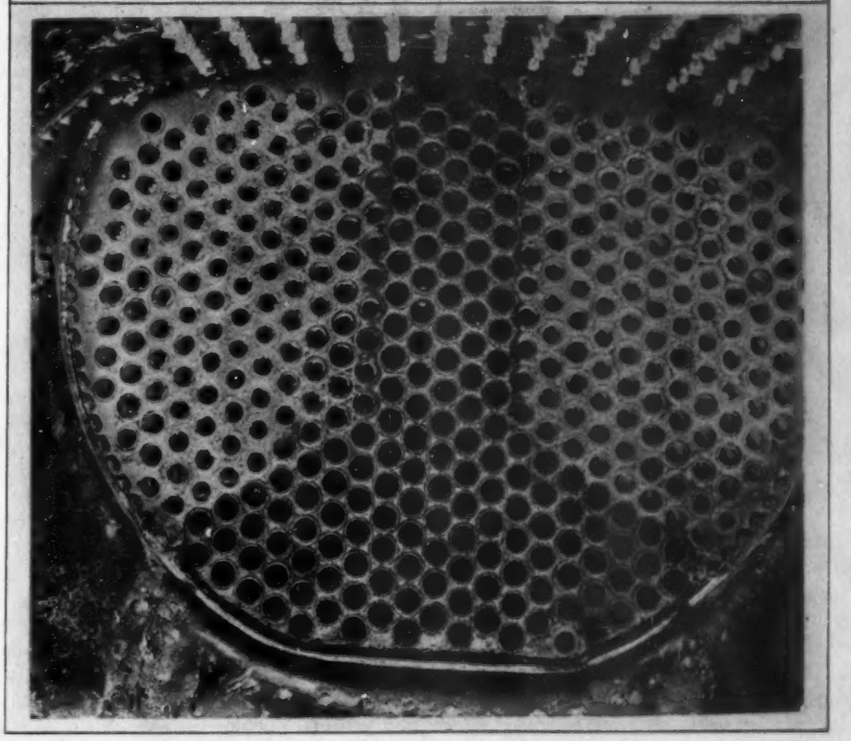


FIG. 3—TYPE OF MOTOR-GENERATOR USED TO SUPPLY CURRENT FOR WELDING ARC

FIG. 4—LOCOMOTIVE BOILER TUBES WELDED BY ARC

Electric Furnace Thermal Efficiency

By Woolsey McA. Johnson.

Thermal efficiency of an electric furnace is the ratio of thermal energy, expressed in calories or B. T. U. usefully absorbed, to the total thermal energy supplied to the furnace. For instance, in heating steel bars in an electric furnace it is necessary to supply theoretically something like 0.1045 kilowatt-hours per pound, or 209 kilowatt-hours per ton of steel treated. If, however, we find that 1 kilowatt-hour per pound of steel is actually used in a furnace, we know that the amount of heat lost in radiation or conduction is: 1.00 — 0.1045 = 0.8955 kilowatt-hours, and that the thermal efficiency is 10.45 per cent. If, however, 250 kilowatt-hours are used per ton, or 0.125 kilowatt-hours per pound of steel, we have a thermal efficiency of 0.1045/0.125, or 83.55 per cent.

Of course, the study of thermal efficiencies, carried too far, will lead to inconsistencies. For example, in the Heroult electric steel furnace, the metal leaves the furnace at approximately the temperature at which it entered, the heat having been supplied in the open-hearth furnace, where the stock was melted down. Thus, the net heat needed or that usefully absorbed is nil, and the thermal efficiency is likewise nil. As a matter of fact, all the heat needed is to keep the steel at working temperature, in order to complete, in a neutral atmosphere, reactions already started in the open-hearth furnace. Accordingly, we may regard it as using all the electrical energy in keeping the furnace, and its contents at a working temperature. On this basis, the efficiency is 100 per cent. The thermal efficiency of an electric furnace can be determined in four ways, each method depending on several factors. The bases of the four are as follows:

1.—Metallurgical calculations of radiation and conduction heat-losses.

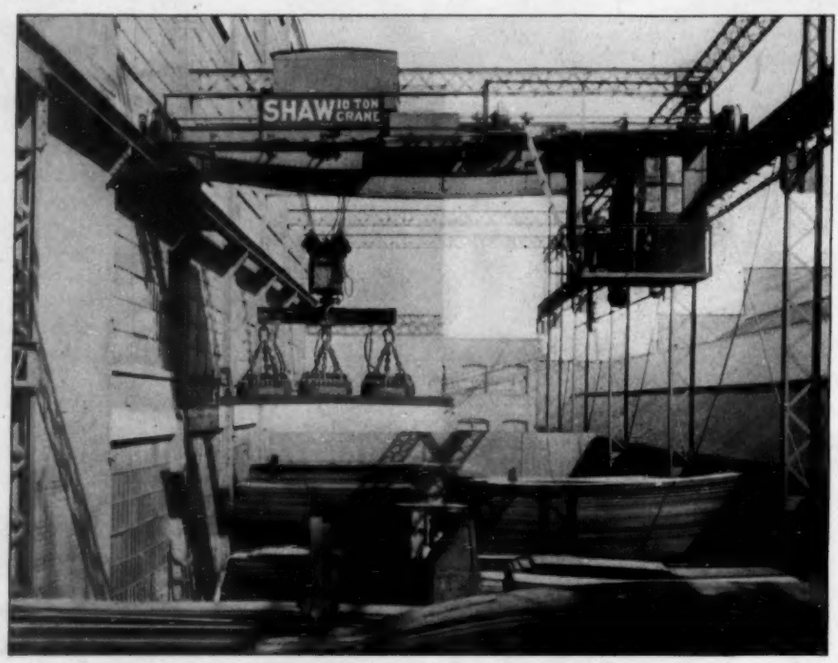
2.—Measuring directly radiation and conduction heat losses, such as heat used in cooling water.

3.—Running furnace with power enough to keep it at its working temperature, and regarding that heat as lost.

4.—Metallurgical calculation of net heat requirements.

Magnet Crane for Handling Steel Plates

For unloading steel plates from railroad cars and stacking and handling them in the stock yard, the Hydraulic Pressed Steel Co., Cleveland, has recently installed a ten-ton crane furnished by the Shaw Electric Crane Co., Muskegon, Mich. The crane is equipped with three lifting magnets manufactured by the Electric Controller & Mfg. Co., Cleveland. An interesting feature of the installation is the motor driven swivel which takes the place of the "ground man" formerly required to turn loads of plates in the desired position before they were dropped. This swivel, placed between the upper and lower lifting beams, is controlled from the crane cab. Another feature is the straightening form into which loads of plates are dropped from the magnets in order to insure their orderly arrangement and conserve space. Thus adjusted, the plates are again picked up and deposited in the yard. To obviate the swaying of loads, which would make accurate placing difficult and tedious, the upper lifting beam is carried on four sheaves, two at each end. These are geared together in pairs. The suspension ropes are thus hung at divergent angles, and it is said this means of suspension does away with all swinging of the plates while under way.



CRANE AND MAGNETS FOR HANDLING STEEL PLATES

The International Oxygen Co., 115 Broadway, New York,, has issued an extremely interesting 24-page booklet entitled "I. O. C. System Production, Pure Oxygen and Hydrogen". This booklet is profusely illustrated, showing I. O. C. System installations as made in various parts of this country and abroad. It dwells chiefly on the methods of producing the oxygen required for cutting and welding in one's own plant.

Portable Motion Picture Outfit

Considerable material has been published in *The Iron Trade Review* from time to time pointing out the great field of usefulness for the motion picture in demonstrating and selling machinery. The Optigraph Co., Chicago, has perfected a portable motion picture projector, which is said to be particularly adapted to industrial purposes. It is equipped with a 500-watt incandescent lamp, which is designed to give satisfactory illumination up to 60 feet, eliminating the necessity for employing an arc light projector. The apparatus can be operated from any ordinary electric light socket, and takes standard size films and slides. It is said that it may be transported from place to place in an assembled condition without the employment of a carrying case.

The amount of sorrow and suffering that will be eliminated when safety work is taken up earnestly by each man is beyond comprehension of those who have not studied the subject carefully, thoroughly and from all angles.

Business Increases

It is officially reported that the Norton Co., Worcester, Mass., has enjoyed a very marked increase in business during the past six months and a prominent official states that the company is now doing a larger business than ever before. This is in part due to orders for grinding wheels required for the manufacture of munitions, but a large portion of the increase seems to come from sources in no way affected by the war. The company advises that it has been operating its plants at capacity for several months and now finds it necessary to make material extensions in order to meet the extraordinary demand prevailing. Large orders for grinding wheels have been received from Italy, England, France, Russia and Scandinavia. Contrary to rumors which have been circulated recently, the Italian orders of the Norton Co. have not been larger than those from other European nations. The additions which the company is making to its facilities are not the result of the sudden development of a grinding wheel business of unheard of proportions, but wholly because of a steadily increasing demand from practically every source.

Electric Iron Smelter

Electrical iron ore smelting in Sweden has passed the experimental stage, it is declared, and has attained to a sound and remunerative industrial basis. The first electric furnace for smelting iron ore was built at Domnarfvet, in 1909. This was followed by a larger experimental furnace at Trollhattan. The first furnace used about 500 kilowatts; the second consuming 1,900 kilowatts. The subsequent Hagfors furnace utilized a load of 2,200 kilowatts and the second Domnarfvet installation used about 3,000 kilowatts. A large furnace is now being built at Soderfors, which will consume at the start 4,500 kilowatts, its capacity to be later increased to 6,000 kilowatts.

The Chicago Bearing Metal Co., Chicago, has closed a contract with the Snyder Electric Furnace Co., 53 West Jackson boulevard, Chicago, for the installation of an electric furnace for melting brass. It will have a 12-hour capacity of 5,000 pounds and will be installed under guarantees as to operating cost and loss by volatilization. The guarantee has been made that the volatilization loss will not exceed 1½ per cent and it is claimed that in actual operation the loss will be considerably below this amount.

Freight Rates

Are Discussed at Chicago Meeting of Traffic Officials

Pittsburgh, Sept. 7.—Traffic officials of railroads operating in the central freight association and transcontinental freight bureau territories informally met at Chicago Sept. 3 to discuss the proposed 55-cent through rate on iron and steel products to the Pacific coast. The Wabash-Pittsburgh Terminal railway has offered a 55-cent rate per 100 pounds, giving shippers in this district the same rate as that prevailing from Chicago. The prevailing rate from Pittsburgh to Pacific coast terminals is 73.9 cents. It is reported that other carriers will adopt the 55-cent rate, and this step probably will divert much of the tonnage now being shipped to Pacific coast points via the Panama canal.

Copies of the amended export tariff rates from western Pennsylvania, eastern Ohio and West Virginia to the Pacific coast, are being received by traffic managers here. Rates in some instances are slightly higher than those prevailing. On bar and slab iron, up to 6 inches in width, hoops and bands, structural iron and steel, iron chains, wire, nails, shafting, etc., the new carload rate is 45.5 cents per 100 pounds, and the less-than-carload rate is 78 cents, based on a 50,000-pound lading. A 44.5-cent rate will prevail on 50,000-pound shipments on angles, bands, bars, beams, bolts, columns, girders, hoops, nuts, rods, etc. The rate on car axles, wheels and tires will be 43.1 cents. The rate on wrought iron and steel pipe and fittings, 12 inches and under in diameter, will be 41.2 cents; this rate also will prevail on tin and terne plate. These rates, in some instances, run about 2 cents above prevailing tariffs.

New Line of Structural Sections

The Carnegie Steel Co., Pittsburgh, in a pamphlet entitled "Structural Beams", describes a new line of sections supplementary to the American standard beam sections. The experience of the bridge and structural trade indicates that the present line of American standard I-beam sections adopted by the Association of American Steel Manufacturers in January, 1896, has been suitable for most of the ordinary uses of bridge building and car construction. In recent years, especially in the construction of modern office buildings and structures intended for light machine shop work, it frequently has been found desirable to use deeper beams than required for safe carrying capacity as determined by the floor loads required by building codes of different cities, with the result that the full strength of a standard beam section not always is developed. Such situations have made desirable the manufacture of somewhat lighter sections of depths equivalent to the American standard beam sections.

In their endeavor to meet this condition, designers follow the outline of the American standard profiles and in consequence light weight sections have been made heretofore with the flanges of the same width and taper, but somewhat thinner and also with thinner webs than the minimum weight American standard sections.

However, the beam sections illustrated in this pamphlet constitute a radical departure from those profiles as regards width, slope and thickness of flanges. The 24-inch beam has a width of 9 inches as compared with 7 inches of the American standard section. The 12-inch beam has a flange width of 6 inches as compared with the 5-inch width of the American standard section. The 27-inch beam is made with the same flange width as the 24-inch beam, but the flange widths of the other sections follow the depths in a gradual sequence; the slope of the flanges is uniformly 1 in 11. The carrying capacities of these sections are theoretically somewhat less than the carrying capacities of the corresponding minimum weight standard sections.

Molding Sand Production in 1914

Owing to the depressed condition of the foundry industry in 1914, the output of molding sand aggregated only 2,751,209 tons, as compared with 3,563,583 tons the previous year, a falling off of 812,374 tons, or 22.7 per cent. In 1912 there was mined 4,485,380 tons, the highest total ever attained by this industry. The output last year was the lowest since 1908, when 1,980,677 tons were taken from the banks. The value of last year's production was $1,756,383, as compared with $2,230,217 in 1913, a decline of 21.2 per cent in value. It is surprising to note, however, that the average price per ton increased from 63 cents to 64 cents per ton from 1913 to 1914. However, since 1909, when the average price per ton was 68 cents, molding sand has steadily declined in value, having reached an average selling price of 61 cents per ton in 1912. According to a bulletin issued by the United States Geological Survey, Ohio leads with a production last year of 547,398 tons, New York ranks second with 428,121 tons, New Jersey is third with 376,605 tons.

Canadian Activity

General Business Conditions Improve—Some Railroad Buying

Toronto, Sept. 8.—Apart from war orders, business conditions are showing a decided improvement. The large harvest in the west has caused a great demand for agricultural machinery. Reports from Winnipeg state that many of the warehouses in Manitoba have been entirely cleaned out and large orders may consequently be expected by eastern manufacturers. Railroad construction in the west has been fairly active and orders for rolling stock are beginning to be received. The Canadian Car & Foundry Co., of Montreal, has secured an order for 100 box cars, from the Alberta Great Waterways and the Edmonton, Dunvegan and British Columbia railways. The latter company also has placed an order for stock cars with the National Steel Car Co., of Hamilton. The Canadian Locomotive Co., Kingston, Ont., is working on an order for 30 large locomotives for the Russian government and is also filling an order for cars for the Canadian government. The company has made arrangements to manufacture trucks for the Baldwin Locomotive Co., Philadelphia.

The Grand Trunk Pacific and Canadian Northern railways have extended their systems in the west, and are expected to be in the market for additional rolling stock in the near future.

The Nova Scotia Steel & Coal Co., in addition to large orders for shells, has made all the steel for the Eastern Car Co., which is building cars for Russia, and has also made large quantities of forgings for the Clyde Shipbuilders.

The first train from Toronto to Vancouver over the Canadian Northern railway left Toronto, Sunday, Aug. 22, with President Sir William Mackenzie and General Manager D. B. Hanna on board.

Combine to Make Shells

Six Baltimore manufacturing companies have associated themselves in order to accept a large contract for ammunition for the Allied armies. The companies interested are the John B. Adt Co., the Sinclair Scott Co., the E. J. Codd Co., the Page Engineering Co., the Chas. White Gas Engine Co. and the E. S. & G. L. Brown Machine Co. The contract is said to amount to $17,000,000. The Baltimore Metal Co., which will handle the ammunition-making of the Bartlett-Hayward Co., has been incorporated with a capital stock of $3,000,000. The Bartlett-Hayward Co., as recently stated, has a contract for shrapnel for Russia.

The Foundry Convention Programs

Allied Associations Will Discuss Interesting Subjects at Atlantic City—
Simultaneous Sessions on Thursday, Sept. 30

ON THE accompanying pages are presented the complete programs for the meetings of the American Foundrymen's Association and American Institute of Metals, at Atlantic City, Sept. 28 to Oct. 1. It is evident that an unusual number of valuable papers are to be presented and it is believed the discussions that will take place will bring out a large amount of information of an exceptionally valuable character. Present indications point to a record-breaking attendance. At the various sessions of the allied associations, 62 papers and reports will be presented and discussed. Both societies will receive reports of committees that have been at work throughout the year, in addition to listening to a large number of individual papers, many of which will be illustrated with lantern slides.

As far as possible, related subjects have been grouped, so that foundrymen interested in certain special lines of work need not attend more than one or two sessions of the convention. In order to cover the ground thoroughly and allow more time for discussion, the American Foundrymen's Association will hold simultaneous technical sessions on Thursday, Sept. 30; one section will be devoted to malleable practice and the other to steel foundry work. The American Foundrymen's Association also will introduce an innovation by holding its annual business meeting for the election of officers on Wednesday evening, Sept. 29, instead of Friday morning, as heretofore.

The convention proceedings will open at 10 a. m., Tuesday, Sept. 28, with a joint meeting of the American Foundrymen's Association and the American Institute of Metals, which will be held in the convention hall at the outer end of Young's pier. The registration bureaus for both associations, which will be located on the pier, will open Monday morning, Sept. 27.

The official headquarters of the American Foundrymen's Association and the American Institute of Metals will be at the Hotel Traymore, the latest addition to Atlantic City's galaxy of hostelries. The headquarters for the exhibition company will be at the Hotel Dennis.

Thursday, Sept. 30, has been set aside as "Philadelphia Day" and an effort will be made to close all Philadelphia foundries on that day to enable their employes to attend the convention and also to view the exhibition.

Program, American Institute of Metals

Tuesday, Sept. 28, 10:00 a. m. Convention hall, Young's Pier

Joint meeting with the American Foundrymen's Association. (For details see A. F. A. program.)

Tuesday, Sept. 28, 2 p. m. Hotel Traymore

GENERAL PAPERS

Report of official chemist, by Arthur D. Little, Inc., Boston.

"An Investigation of Fusible Tin Boiler Plugs", by Dr. G. K. Burgess, Bureau of Standards, Washington, D. C.

"The Influence of the Impurities of Spelter on the Cracking of Slush Castings", by Gilbert Rigg, New Jersey Zinc Co., Newark, N. J.

"Cobalt in Non-Ferrous Metals", by H. T. Kalmus, Kalmus, Comstock & Westcott, Cambridge, Mass.

"Furnace Methods for Pure Castings", by F. L. Antisell, Raritan Copper Works, Perth Amboy, N. J.

"Standard Test Specimen of Zinc-Bronze: Cu. 88, Sn. 10, Zn. 2. Relation of the Mechanical Properties to the Microstructure", by Dr. H. S. Rawdon, Bureau of Standards, Washington, D. C.

"Notes on the Copper-Rich Kalchoids", by S. L. Hoyt, University of Minnesota, Minneapolis.

Tuesday, Sept. 28, 8 p. m.

Theater party.

Wednesday, Sept. 29, 10 a. m. Hotel Traymore

"The Effect of the Present European War on the Metal Industries", by Thos. F. Wettstein, United Lead Co., New York.

"Sherardizing", by Dr. S. Trood, U. S. Sherardizing Co., New Castle, Pa.

"Electric Furnace for Brass Melting", by F. A. S. Fitzgerald, Fitzgerald Laboratories, Niagara Falls, N. Y.

"Substitutes and Alloys to Take the Place of Platinum", by W. E. Mowrey, St. Paul, Minn.

"Alloys of Nickel, Chromium and Copper", by David F. McFarland and O. E. Harder, University of Illinois, Urbana, Ill.

Wednesday Sept. 29, 2 p. m. Hotel Traymore

ALUMINUM AND ALUMINUM ALLOYS

"Aluminum Die Castings", by Chas. Pack, Doehler Die Casting Co., Brooklyn, N. Y.

"The Manufacture and Use of Alumino-Vanadium", by Wm. W. Clark, Seymour Mfg. Co., Seymour, Conn.

"Recent Advances in the Manufacture and Uses of Aluminum", by E. V. Pannell, British Aluminum Co., Toronto, Ont.

"The Welding of Aluminum", by E. V. Pannell, British Aluminum Co., Toronto, Ont.

"Aluminum Bronze Alloys", by W. M. Corse, Titanium Alloy Mfg. Co., Niagara Falls, N. Y.

Thursday, Sept. 30, 10 a. m. Hotel Traymore

ACID METALS AND BEARING BRONZES

"Development of an Acid-Resisting Alloy", by S. W. Parr, University of Illinois, Urbana, Ill.

"Methods of Analysis for Complex Alloys", by S. W. Parr, University of Illinois, Urbana, Ill.

"Effect of Zinc on Copper, Tin, Lead Alloys", by G. H. Clamer, Ajax Metal Co., Philadelphia.

"The Advantages of a Standard Railway Journal", by Russell R. Clark, Pennsylvania railroad, Pittsburgh.

Thursday, Sept. 30, 2 p. m. Hotel Traymore

FORGING AND ROLLING ALLOYS

"Forging Manganese Bronze", by Jesse L. Jones, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

"The Failure of Structural Bronzes", by Dr. P. D. Merica, Bureau of Standards, Washington, D. C.

"Experiences with Brass in Civil Engineering Work", by A. D. Flinn, board of water supply, New York.

"Stellite", by Elwood Haynes, Haynes Stellite Works, Kokomo, Ind.

Thursday, Sept. 30, 7 p. m. Hotel Traymore

Annual banquet.

Program, American Foundrymen's Association

Tuesday, Sept. 28, 10 a. m. Convention hall, Young's pier

Joint session, American Foundrymen's Association and American Institute of Metals.

Addresses of welcome and response.

Report of A. F. A. committee on safety, by A. W. Gregg, chairman, Bucyrus Co., South Milwaukee, Wis.

"Tests of Lenses for Foundry Goggles", by F. W. King, Julius King Optical Co., New York. This address will be accompanied by a demonstration of a lens testing machine and a colored spectrascopic test showing scientifically, colors of lenses used in dangerous conditions of light and glare.

Report of A. F. A. committee on industrial education, by Frank M. Leavitt, chairman, University of Chicago, Chicago.

"Functions of Sand Binders", by Henry M. Lane, consulting foundry engineer, Trussed Concrete Bldg., Detroit.

"Notes on Applications and Characteristics of Cores in Modern Molding", by R. A. Bull, Commonwealth Steel Co., Granite City, Ill.

"Molding Sands", by C. P. Karr, associate physicist, Bureau of Standards, Washington, D. C.

Appointments of nominating and resolutions committees.

Tuesday, Sept. 28, 2:30 p. m. Convention hall, Young's pier

Report of A. F. A. committee on specifications for foundry scrap, by S. D. Sleeth, chairman, Westinghouse Air Brake Co., Wilmerding, Pa.

"Patternmaking for Molding Machine Work", by E. I. Chase, Cadillac Motor Car Co., Detroit.

"Foundations for Jar-Ramming Molding Machines", by E. S. Carman, Osborn Mfg. Co., Cleveland.

"The History and Development of the Molding Machine with Sidelights on Latter-Day Practice", by J. J. Wilson, Cadillac Motor Car Co., Detroit, and A. O. Backert, The Foundry, Cleveland.

"Scientific Management and Its Relation to the Foundry Industry", by H. K. Hathaway, Tabor Mfg. Co., Philadelphia.

"Reclaiming Molding Sand", by W. M. Saunders and H. B. Hanley, Saunders & Franklin, analytical and consulting chemists, Providence, R. I.

"The Relation of the Foundry Foreman to his Employer", by S. V. Blair, Rushville, Ind.

Tuesday, Sept. 28, 8 p. m.

Theater party for members and ladies of the American Foundrymen's Association and the American Institute of Metals.

Wednesday, Sept. 29, 10 a. m. Convention hall, Young's pier

"The Modern Foundry Advance", by Dr. Richard Moldenke, consulting metallurgical engineer, Watchung, N. J.

"Manufacture, Constitutents and Essentials in the Purchase of Pig Iron for Foundry Use", by Oliver J. Abell, The Iron Age, Chicago.

Report of the A. F. A. committee on costs, by B. D. Fuller, chairman, Westinghouse Electric & Mfg. Co., Cleveland.

"Organization in the Foundry of the University of Illinois Shop Laboratories", by R. E. Kennedy and J. H. Hogue, instructors, University of Illinois, Urbana, Ill.

"The Structural or Mechanical Theory of the Effect of Rust on Cast Iron and Wrought Iron or Steel", by R. C. McWane, publisher of The Fire Engineer, and Harry Y. Carson, Central Foundry Co., New York.

Wednesday, Sept. 29, 2:30 p. m. Convention hall, Young's pier

GRAY IRON SESSION

"Pouring Systems for Gray Iron Foundries", by H. Cole Estep, associate editor, The Foundry, Cleveland.

"Fuel Oil Cupolas", by Bradley Stoughton, consulting metallurgical engineer, New York City.

"Inspection of Automobile Castings", by C. B. Wilson, Wilson Foundry & Machine Co., Pontiac, Mich.

"Common Defects in Gray Iron Castings—Their Causes and Remedies Therefor", by Herbert M. Ramp, Elmwood Castings Co., Cincinnati.

Report of A. F. A. committee on specifications for gray iron castings, by W. D. Putnam, chairman, Detroit Testing Laboratory, Detroit.

Report of A. F. A. committee on standard methods for analyzing coke, by H. E. Diller, chairman, General Electric Co., Erie, Pa.

Wednesday, Sept. 29, 8 p. m., Hotel Traymore

ANNUAL BUSINESS SESSION

Annual address of the president, R. A. Bull, Commonwealth Steel Co., Granite City, Ill.

Report of the secretary-treasurer, A. O. Backert, Cleveland.

Report of the auditor.

Report of the nominating committee.

Election of officers.

Thursday, Sept. 30, 10 a. m. and 2:30 p. m., Convention hall and annex, Young's pier

STEEL SESSIONS

"Dynamic Properties of Steel Employed in the Manufacture of Castings of Various Types", by J. Lloyd Uhler, Union Steel Casting Co., Pittsburgh.

"The Particular Application of the Converter in the Manufacture of Steel Castings", by C. S. Koch, Fort Pitt Steel Casting Co., McKeesport, Pa.

"Notes on Electric Furnace Construction and Operation in the Steel Foundry", by James H. Gray, U. S. Steel Corporation, New York City.

"Open-Hearth Furnace Checker Design", by W. A. Janssen, Bettedorf Co., Davenport, Iowa.

"Causes of Shrinkage Cracks in Steel Castings", by William R. Bossinger, Marion Steam Shovel Co., Marion, O.

Report of A. F. A. committee on specifications for steel castings, by W. C. Hamilton, American Steel Foundries, Granite City, Ill.

Report of A. F. A. committee on steel foundry standards, by Dudley Shoemaker, American Steel Foundries, Indiana Harbor, Ind., and R. A. Bull, Commonwealth Steel Co., Granite City, Ill.

"Notes on Arc Welding", by Robert Kinkead, Lincoln Electric Co., Cleveland.

MALLEABLE SESSIONS

"Some Remarks Regarding the Permissible Phosphorus Limit in Malleable Iron Castings", by Prof. Enrique Touceda, Rensselaer Polytechnic Institute, Albany, N. Y.

"Standardization of Air Furnace Practice, by A. L. Pollard, Johnston Harvester Co., Batavia, N. Y.

"An Outline to Illustrate the Interdependent Relationship of the Variable Factors in Malleable Iron Practice", by L. E. Gilmore, Baltimore Malleable & Steel Co., Baltimore.

Paper on malleable practice, by J. P. Pero and J. C. Nulsen, Missouri Malleable Iron Co., East St. Louis, Ill.

"Coal—Its Origin and Use in the Air Furnace", by F. Van O'Linda, Consolidation Coal Co., Chicago.

Thursday, Sept. 30, 7 p. m., Hotel Traymore

Annual banquet.

Friday, Oct. 1, 10 a. m., Convention hall, Young's pier

Introduction of new officers.

Report of committee on resolutions.

Appointment of standing committees.

Unfinished business.

Practical Steel Man in Uncle Sam's Service and Yours

BY L. W. MOFFETT

EXPANSION of the export trade of American manufacturers through the aid of the bureau of foreign and domestic commerce, is a well recognized factor among producers in this country who have been and are seeking markets abroad. Of particular interest to the iron and steel industry is the fact that the bureau's branch at Chicago, which has jurisdiction over the territory including Minnesota, Wisconsin, Michigan, Ohio, the Pittsburgh district, northern Illinois and northern Indiana, is in charge of a man who possesses both a technical and practical knowledge of the steel business. His name is Dr. W. C. Huntington, who became commercial agent at the Chicago office on March 22, 1915. He is a graduate in mechanical engineering from Columbia University, where he specialized in iron and steel metallurgy. Later he was employed for two years with the National Tube Co. as assistant to Frank M. Speller, metallurgical engineer, and subsequently served the same period as metallurgist at Gary. Then he went to Germany and entered the Royal Technical University at Aachen and took a course in iron and steel metallurgy, graduating with the degree of doctor of engineering. For the purpose of acquiring further practical experience, he worked in steel plants in Germany and in Liege, Belgium, and also visited one-half of the steel works in Germany and went through large plants in France, Belgium and England.

DR. W. C. HUNTINGTON

His academic instruction included a course in business economics and languages, German and French being mastered. Desiring to take up export trade, he acquired a technical knowledge, became acquainted with the products of foreign countries, especially those with which the United States would have to compete in building up markets abroad. With the outbreak of the European war in August, 1914, Dr. Huntington returned to the United States and was associated with the metallurgical department of the National Tube Co. for about seven months. Then he took an examination of the bureau of foreign and domestic commerce, dealing with the elements of foreign trade, statistics and economic resources and prepared an essay on "The Rise of the Iron Trade in Germany", writing his material in the German language. After going through routine work in Washington, Dr. Huntington went to New York to observe the work of the branch office of the bureau at New York. He succeeded H. H. Garver as commercial agent in charge of the Chicago office, Mr. Garver having resigned to become connected with the Chicago Association of Commerce. Dr. Huntington, during his brief connection with the Chicago office, has accomplished results which mean much for manufacturers of this country who are developing business abroad.

It is the duty of the bureau to bring proposed foreign purchasers and American manufacturers together and through the branch offices it co-operates in every way possible to bring this end about. Every device at their command is used by the commercial agents to help the American manufacturers to find foreign markets, and to show them how to handle their new trade. A great government machine is pressed into use to develop this work. For instance, American consulates, connected with the state department, learn of buyers abroad who are coming to the United States to look over the markets with a view to making purchases, and immediately advise the commercial agents of the bureau of foreign and domestic commerce of the coming of the proposed purchasers. This information is transmitted either by cable or mail, as the situation requires, and is supplied to any of the eight branch offices of the bureau in the United States, depending upon the destination of the foreign visitor and the line of goods he desires to purchase in this country.

He is met by the commercial agent, the branch office is thrown open to him and he is invited to make it his headquarters and to use it for any purpose he may choose in connection with his business. Assuming that he is seeking a certain line of steel products, he is taken through plants producing the kind of material he wishes to purchase, after he has been introduced to officials of the steel plants through the commercial agents. Some substantial export business for steel interests in this country has been built up through this plan with the aid of Dr. Huntington, who is thoroughly conversant with both the manufacturing and business end of the steel trade. The bureau, through its commercial agents, has a number of other methods by which it aids the American manufacturer desiring export business and has become a clearing house about foreign business, anxious to give any information it has to the manufacturer who seeks it. The commercial agents are constantly getting into closer touch with local business organizations, such as chambers of commerce and other trade bodies. Exchanging information is an important element in the work it is desired to accomplish. In no case does the bureau, through its branch offices, duplicate or compete with the work of local organizations. Where the government has no office performing this work, it empowers local organizations to act for it, and they are given exactly the same information that the bureau gets. This is really a new plan—it makes a direct connection between the government and business bodies, which report to Washington.

Business concerns are encouraged to send samples of their products and catalogs to the branch offices to be exhibited, and while this feature is still in its infancy, it is hoped to develop it until the branch offices will have exhibit rooms. Buyers from abroad will be taken to these rooms and shown the displays. In addition, trade papers of all kinds are kept at the branch offices and are found to be invaluable in acquainting the commercial agents with the tremendous business activities of the nation and to fortify them with information for the foreign purchaser. Likewise, the trade journals are of much value to the foreigner who possesses a readable knowledge of the English language.

The bureau also has been greatly aided in its work of building up foreign markets for American manufacturers through the commercial attaches now connected with the department of commerce as provided for in the legislative, executive and judicial act of the first session of the sixty-third congress. The work of these attaches was explained comprehensively in an interesting article in *The Iron Trade Review*, Dec. 31, 1914, by A. H. Baldwin commercial attache at London and formerly chief of the bureau of foreign and domestic commerce. The daily publication of the department of commerce, *Commerce Reports*, carries information and notices of opportunities to sell American goods abroad and has proven a lively medium. There is further maintained, Dr. Huntington said, an index of some 13,000 American manufacturers interested in exporting their products, classified in great detail by articles. These receive automatically confidential circulars apprising them of opportunities to sell in their line as they arise. Often these confidential circulars are issued within 24 hours of the receipt of a cablegram.

Business men are appreciating the work of the bureau and skepticism as to its practicability no longer exists among those who have come into personal contact with the situation.

Because of its jurisdiction, the Chicago branch of the bureau of foreign and domestic commerce comes into touch with more iron and steel manufacturers who are seeking foreign markets than any other office. Dr. Huntington has put his training in steel manufacturing and business methods to good use.

Foreign Trade

Will Be Sought by a Sales Company Organizing in Chicago

Chicago, Sept. 8.—A movement has been started in Chicago for forming a company with $100,000 capital stock to be incorporated under the laws of Illinois and to be known as the International Manufacturers' Sales Co. of America. Its purpose is to establish trade with Russia in American made products. The plan is to admit 50 noncompeting manufacturers, each taking $2,000 in stock. The main office is to be established in Chicago, where information as to Russian trade conditions will be available and an office in New York which will superintend routing and obtaining of rates.

The principal office in Russia is to be at Moscow with branches in Riga, Petrograd and other important centers. The plan is to sell goods at the export price with sufficient profit added to cover the overhead expense and if any excess results, it will be converted into a fund which will accumulate indefinitely.

The Chicago office will be placed in charge of A. S. Postnikoff and X. B. Kalamantiano. The former is a native of Russia. He has had 18 years' business experience in that country and formerly was connected with the International Harvester Co. The latter was engaged in business in Russia for eight years and has represented the J. I. Case Co. and the Avery Co. For a time, he taught Russian at the University of Chicago, where he received part of his education.

A preliminary meeting looking toward this organization has been held in Chicago, attended by representatives of manufacturers in many important industrial centers. Proceedings of this meeting will be printed and circulated among concerns interested in the formation of the company and a further meeting then will be held for further action and actual organization.

Wages Advanced in New England

The New England Westinghouse Co., employing between 2,500 and 3,000 hands, mostly machinists, has granted the eight-hour day to employes in its factories in Chicopee Falls and East Springfield, Mass., and in Meriden, Conn., effective Sept. 13. The present working time is 9¾ hours a day. The wages of employes will not be reduced, and piece work prices will be advanced to enable piece workers to earn as much as under the existing hours. The company agrees to pay time and one-half overtime wages for all work done after eight hours.

The New London Ship & Engine Co. has posted notice in its plant in Groton, Conn., offering a bonus of 10 per cent weekly in addition to the regular pay of the employes. It is estimated that the bonus will amount to $100,000 a year.

The New Departure Mfg. Co., Bristol, Conn., which has a strike on its hands, started this week on a nine-hour day, with Saturday half holidays the year round and with 10 per cent increase in wages to offset reductions due to a shorter work day. The strikers' demands were the same as those granted by the company except that they want the present wages plus a 10 per cent increase.

Ten hours a day, a 55-hour week and more pay, is the new schedule put in effect at the Whitin Machine works, Whitinsville, Mass., last week. The big plant has been running on a 57-hours a week schedule for eight years. The 2,000 employes will have Saturday afternoons off. The new schedule was made voluntarily by the company. There never was any dissatisfaction or strike talk among the employes.

New Makers Name Early Deliveries

Inquiries for 10,000 Tools Stir Market—Carnegie Steel Co. and Pennsylvania Railroad in Market for Equipment—Cincinnati Offered Big Shell Contracts

THE large purchases which continue to feature the machine tool market are mostly for foreign account and while the current export demand comes from practically all the belligerent countries in Europe, the biggest orders recently have come from France, Italy and Russia. Orders from these countries during the past week or 10 days have involved from 1,000 to 1,500 lathes, in addition to large numbers of screw machines and other tools. Perhaps the larger part of the lathe business was taken by concerns which only recently entered into the manufacture of these machines in order to take advantage of the big war demand. As a result, deliveries on these lathe orders, in a great many cases, will begin as early as October. Among developments which aroused interest during the week was the appearance of some exceptionally large inquiries. One of these inquiries involved 5,000 lathes, while another called for prices on an equal number of screw machines. Domestic munition makers continue to enter the market for their miscellaneous requirements but their current purchases do not compare in magnitude with those made by such interests in previous weeks.

The Seaboard Air line has placed orders for a few more tools in addition to those purchased last week. The Lehigh & New England railroad has not yet closed its list and is not expected to do so for probably a month. It is reported the Morgan line shortly will be in the market for machine tools. Among eastern concerns which are expanding their capacity are the Hartford Automobile Parts Co., Hartford, Conn., which will move to New Britain, Conn.; the Hurlburt Motor Truck Co., which has purchased the old plant of the J. L. Mott Iron Works in New York; the American La France Co., Elmira, N. Y.; Bosch Magneto Co., Springfield, Mass.; Smith & Winchester Co., South Windham, Conn.; Crocker-Wheeler Co., Ampere, N. J.; Taylor & Fenn Co., Hartford, Conn.; New Departure Mfg. Co., Bristol, Conn., and others.

Pittsburgh Gets Business at Home

With deliveries of special machinery for the manufacture of various types of war material deferred from 60 days to six months, Pittsburgh machine tool dealers now are manifesting renewed interest in the domestic market, which continues to broaden. The Carnegie Steel Co., which recently purchased 10 lathes, is negotiating for six motor-driven lathes, ranging from 24 inches to 36 inches and two 30-inch belt-driven lathes, completely equipped. The company also is inquiring for a large hydraulic press; this equipment, it is understood, is for domestic work. The Pennsylvania Railroad Co. has purchased a large combination punch and shear for its shops at Altoona, Pa., and is asking bids on a double housing multiple punch, which will be purchased shortly.

The Greenville Steel Car Co., Greenville, Pa., has purchased a 24-inch open-gap punch and may buy additional equipment soon. The Pittsburgh Steel Car Co., recently incorporated, has purchased a 100-acre site near Shenango, Pa., and will erect a modern car shop. The Central Steel Co., Massillon, O., which recently awarded contracts for four additional open hearth steel furnaces, will need additional cranes, ladles, ingot buggies, etc. Reports that the National Tube Co. plans to extend plants in the Wheeling district are officially denied. The Wheeling Corrugating Co., Wheeling, W. Va., has purchased a site at Chicago and will erect a $200,000 plant. Builders of heavy rolling mill equipment are driving their foundries and machine shops at capacity, with enough orders on their books to assure continued activity for several months.

Chicago Dealers Hesitate to Quote

Machine tool dealers in Chicago are meeting many difficulties in conducting their business. It is next to impossible to obtain machines with which to fill inquiries. Owners of second hand machines are asking exorbitant prices and the market has been already well combed. Foreign buyers continue to seek supplies and Canadian concerns are especially active in securing more machines.

The local demand appears to be better than a year ago. This would be more evident if the export demand were not so heavy. Dealers find, however, that a considerable number of machines of various types are being taken by machine shops throughout this territory.

Prices for new machines are becoming increasingly indefinite and most makers have withdrawn all quotations or will quote only on each inquiry as it is presented at their main sales offices. Dealers are unable to furnish figures to prospective buyers without referring to the builders.

Some makers of machine tools in this district who have been operating their plants at capacity have not participated in any of the business placed by foreign buyers who have visited this country. On the contrary they have found more than they could handle in orders sent by their regular agents in this country and abroad.

Shipments to Russia by way of Archangel will cease later in the season as that port will be ice bound. The remainder of Russian orders which may be ready before spring will go west by way of Vladivostok at the eastern end of the trans-Siberian railway.

The Crane Co. has bought several single tools to add to the equipment of its new plant at Corwith, but apparently is not ready to issue a general list until prices have returned to normal. Equipment from its old plant is being placed and only such machines as are absolutely necessary are being purchased.

Peace Talk Affects Market

In Cincinnati, inquiry for shrapnel has been the chief feature of the week. In addition to a recent offer of orders for 15,000,000 shrapnel and high explosive shells, the Cincinnati chamber of commerce has received a new inquiry for 10,000,000 high explosive shells at $14.75 each, and 10,000,000 shrapnel to conform to the French government's specifications, at $15 each. The demand for machine tools is receding. There is not as much new business in sight for future delivery as was the case a month ago, and prospects of peace in Europe are said to have caused

Here's a Floor That Won't Wear Out

THE Commonwealth Steel Company, Granite City, Ill., need a floor of that kind in this plant. These immense steel castings and heavy car truck frames have to be moved about—tremendous loads are piled upon it.

¶ To get a floor that would not crush, crumble or corrugate—that would reduce truck labor to the minimum and be serviceable always—they put down an

AYER & LORD

Interior Wood Block Floor

THIS SHOWS HOW THESE BLOCKS ARE LAID. THE FLOOR BECOMES IRONED OUT BY USE INTO A DENSE, SOLID, SMOOTH, UNIFORM MASS.

¶ This installation has resulted in floor efficiency of the highest order, at practically no further cost for up-keep.

¶ When properly laid, Ayer & Lord Interior Wood Block Floors increase in strength, smoothness and firmness the more use they get. These blocks become more and more compact, offering extraordinary resistance and resiliency under the extremes of weight and wear.

¶ This floor is dustless and noiseless—a low conductor of either heat or cold. It is highly sanitary and will not rot; is comfortable for employees to work on and a safeguard against accident.

¶ If you are aiming at greater efficiency in your plant investigate the possibilities of an Ayer & Lord Interior Wood Block Floor.

Write us for new booklet "FLOORS"

It contains further information—photographs of installations of every character. Tell us something of your floor problems—our engineering department will gladly advise and specify to suit your conditions without any obligation being incurred.

Ayer & Lord Tie Co.

Railway Exchange CHICAGO

CLEVELAND, OHIO
926 Illuminating Building

MEMPHIS, TENN.
142 Exchange Building

KANSAS CITY, MO.
1117 Rialto Building

PHILADELPHIA, PA.
319 Perry Building

15-I

AYER & LORD TIE CO. INCORPORATED AYER & LORD INTERIOR Always Easy on the Feet WOOD BLOCKS RAILWAY EXCHANGE, CHICAGO

the withdrawal of several large inquiries for munitions of war. Machinists in Cincinnati are demanding a 48-hour week with the same pay they are now receiving for 52½ hours work. Wages were voluntarily increased 10 per cent recently by practically every machine shop in Cincinnati.

EASTERN STATES

LUBEC, ME.—The American Can Co. is erecting an addition to its plant.

BROCKTON, MASS. — Independent Wire Nail Mfg. Co. has been incorporated; $6,000 capital stock; by W. F. Thomas, G. V. Fortier and G. W. Folsom Jr.

MALDEN, MASS. — National Oxygen Products Co. has been incorporated; $100,000 capital stock; by Richard A. Thomas, Charles F. Deenan and Arthur A. Moulton.

MALDEN, MASS.—Parks-Osgood Co. has been incorporated to manufacture motor vehicles; $25,000 capital stock; by Howard Osgood, George A. Parks Jr., and Paul M. Foss.

NORTHBORO, MASS.—American Gill Screw Co. has leased the Gibson factory and will move to its new quarters Oct. 1. New machinery will be installed and the capacity of the plant doubled.

SPRINGFIELD, MASS.—Bosch Magneto Co. has let contract for a 1-story, 170 x 300-foot addition.

WALTHAM, MASS. — Waltham Emery Wheel Co. has started work on a 1-story, 20 x 75-foot addition.

WORCESTER, MASS.—Baldwin Chain & Mfg. Co. has purchased a site adjoining its present property on Austin street and will erect an addition.

CHESTER, CONN. — Middlesex Chemical Co. has been incorporated to manufacture analine dyes; $1,000,000 capital stock; by E. Mora Davison, John T. Hetterick, F. A. Palen, J. J. Coakley, J. P. Davine and Percy C. Manus.

HARTFORD, CONN.—Taylor & Fenn Co., Elmwood, has let a contract for the erection of a 2-story and basement, 42 x 106-foot addition.

HARTFORD, CONN.—Pierson Engineering & Construction Co. has filed a certificate showing a change of location from Bristol to Hartford.

HARTFORD, CONN.—Asa S. Cook Co., manufacturer of machinery, has awarded the contract for the erection of a 1-story factory building, 70 x 210 feet on Franklin avenue, a 2-story office building, 40 x 95 feet, also will be erected.

HARTFORD, CONN.—Hartford Automobile Parts Co. will vacate the Colt west armory and move to New Britain, Conn., to occupy a building to be put up by the New Britain chamber of commerce. The building will be 2-story, 60 x 200 feet and so constructed that two additional stories may be added.

HARTFORD, CONN. — Hartford Automobile Parts Co., among the concerns recently asked to vacate the Colt West Armory, will locate in New Britain, Conn. The company will lease for five years, a new 2-story building, 60 x 200 feet, and will then purchase the plant. The Hartford Automobile Parts Co. recently installed about $30,000 worth of new machinery.

NORWICH, CONN. — Hopkins & Allen Arms Co. has been awarded a contract by the Belgian government for 150,000 to 200,000 Mauser rifles.

ORANGE, CONN.—Cameron Car Co. has been incorporated; $200,000 capital stock; by Everett S. Cameron, Forrest F. Cameron, A. C. White, and Albion B. Emerson, all of West Haven, Conn.

SOUTHINGTON, CONN. — Blakesley Forging Co. has increased its capital stock by $100,000.

SOUTH WINDHAM, CONN.—Smith & Winchester Co. is about to let contract for the erection of a foundry addition 69 x 85 feet.

WATERVILLE, CONN.—Roswell A. Clark, president of the Waterville Cutlery Co., states the concern has secured a contract for 500,000,000 shells for cartridges, and 100,000,000 clips.

PROVIDENCE, R. I.—Options on land at Bristol Ferry, including a wharf, have been acquired by Nathaniel G. Herreshoff, Paul Rainey and others. It is understood a new company, with capital of $1,000,000 will be formed to establish a ship building plant on the site.

ALBANY, N. Y.—Imperial Engineering Co. has been incorporated to build steam separators, boilers, machinery of all kinds; $25,000 capital stock; by H. Poege, H. and D. Morris, 277 Broadway, New York City.

BROOKLYN.—Damage estimated at $50,000 was caused by fire at the Peterson & Brooklyn Foundry Co., Orchard street and Boulevard, Astoria.

BUFFALO. — Militaire Autocycle Co. of America has been incorporated to manufacture autocycles, bicycles and motor vehicles; $250,000 capital stock; by N. R. Sinclair, George C. Miller and Edward McM. Mills, all of Buffalo, N. Y.

ELMIRA, N. Y.—American LaFrance Co. is clearing the site for a 2-story, 130 x 150-foot addition.

NUNDA, N. Y.—Nunda Electric Light Co. has been incorporated to produce heat and power for city use; by L. A. Willard, M. L. and H. J. Gordon, Nunda, N. Y.

ARDMORE, PA.—Auto Car Co. will erect a 5-story and basement, 60 x 77-foot addition to its plant.

BERWICK, PA.—American Car & Foundry Co. plans the erection of a steel and corrugated iron building, 100 x 400 feet, to be used for assembling cars.

ERIE, PA.—Erie County Electric Co. has commenced work on a 1-story, 39 x 84-foot shop building.

PHILADELPHIA.—The H. A. May Foundry, Thirtieth and Ludlow streets, suffered considerable damage by fire.

CAMDEN, N. J.—Wood Mfg. Co. has let a contract for construction of a 142 x 164-foot addition.

KENILWORTH, N. J.—American Can Co. has enlarged its site by the purchase of several additional lots.

METUCHEN, N. J.—J. B. Owen Floor & Wall Co., Zanesville, O., will erect a 2-story and basement, 200 x 500-foot plant at Meluchen.

BALTIMORE.—Poole Engineering & Machine Co. has plans in progress for the erection of a 1 and 2-story addition to its plant in Woodberry.

BALTIMORE.—Curtis Bay Distillery Co. has awarded the Potthoff Construction Co., Cincinnati, O., a contract for the erection of a $1,000,000 denatured alcohol distillery at Curtis Bay. The 12 buildings comprising the group will contain about ten acres of floor space.

CENTRAL STATES

AKRON, O. — Williams machine shop is making an addition to its plant at North Warwood, O. The company will specialize in the manufacture of steel pipe.

AKRON, O.—Bids will be opened Sept. 17 for the construction of sub and superstructure of Gilchrist bridge, Springfield township. C. L. Bower is clerk of the board of county commissioners.

CINCINNATI.—Bids will be received the latter part of September for a concrete bridge to connect Erie avenue with the new Hyde Park high school. The contract will be let by the board of education.

CLEVELAND. — Cleveland Wire Cloth & Mfg. Co. has increased its capital stock from $100,000 to $150,000.

CLEVELAND.—Electrical machinery in the plant of the Upson Nut Co., Scranton road, was damaged by a $7,500 fire.

CLEVELAND. — Crystal Oil & Paint Co. considers increasing its capital stock by $50,000. The company also plans the erection of a modern oil, paint and chemical plant. G. M. Adams is president.

DAYTON, O.—Foundry equipment will be required by the Dayton Steel Foundry Co.

DAYTON, O.—Dayton Iron & Steel Co. has leased a factory building on East Third street.

DAYTON, O.—Special machines and other equipment will be needed by the Dayton Flat-iron Works Co., to equip 150 x 300-foot plant additions.

DAYTON, O.—Dayton Automatic Tool Co. has leased a factory building at Edgemont, having switching facilities on the Big Four railroad.

DENNISON, O.—Foundry equipment will be needed by the Dennison Foundry & Machine Co., which will enlarge its plant.

MASSILLON, O.—Peerless Drawn Steel Co. has increased its capital stock from $100,000 to $200,000.

SPRINGFIELD, O.—Nolte Brass Co. will build a 1-story, 42 x 210-foot foundry addition.

SPRINGFIELD, O.—Plans have been completed for an addition to the Nolte Brass Works. Building will be 44 x 208 feet.

TOLEDO, O. — Universal Motor Co. has been incorporated; $100,000 capital stock; by Howard Lewis, Harold J. Kehoe, Frank S. Lewis, Paul W. Alexander, and Frederick W. Gaines.

WARREN, O.—Searchlight Gas Co., whose plant was recently damaged by fire, plans to carry on its business in the open until the new buildings are ready for occupancy.

WARREN, O. — Hackendorn Construction Co., Indianapolis, Ind., has been awarded a contract for the construction of the Summit street bridge.

HUNTINGTON, W. VA.—J. H. Sluss Construction Co. has been incorporated; $50,000 capital stock; by B. M. Robinson, J. H. Sluss, G. H. Sluss, Maggie Sluss, and Pearl Sluss, all of Huntington, W. Va.

MARTINSBURG, W. VA. — Automatic Train Signal & Control Co. has been incorporated to manufacture control signals; $25,000 capital stock; by A. C. Farley, J. Ferdinand Gerling, E. J. Fulk, W. H. Brown, and A. C. McIntire, all of Martinsburg, W. Va.

WHEELING, W. VA.—Wheeling Steel & Iron Co. is about to have plans prepared for a sheet bar mill at Benwood.

WHEELING, W. VA.—Merchant & Evans Co., Philadelphia and North Warwood, O., plans the erection of a plant at North Warwood for the manufacture of steel pipe.

CANNEL CITY, KY. — Kentucky Block Cannel Coal Co. plans the erection of a plant to manufacture aniline dyes.

CYNTHIANA, KY.—Kentucky Utilities Co., Lexington, Ky., plans the purchase and improvement of the Cynthiana Electric Light Co.'s plant.

ELIZABETHTOWN, KY. — Cumberland traction Co. has been incorporated; $50,000 capital stock; by G. H. Greenup, L. R. Nunn and F. L. James.

HAWESVILLE, KY.—Hawesville Water &

OUR PRODUCTS

"AGATHON" Chrome Nickel
"AGATHON" Chrome Vanadium
"AGATHON" Nickel Steels
"AGATHON" Special Analyses
"AGATHON" Vanadium
"AGATHON" Silico-Manganese
"AGATHON" Chrome Steel
"AGATHON" High Carbon

The Mark of
DISTINCTIVE EXCELLENCE

The ancient Greeks were long on quality. In whatever they attempted they excelled. Much of their work still stands, and to the whole World is an example of the utmost skill and excellency.

The word the Greeks used to express this ultra-quality was "AGATHON."

As in the olden days "AGATHON" was resounded throughout all Greece, so today it is being resounded throughout all America, descriptive of a new steel—a steel of highest quality, so scientifically and carefully made that its manufacture is no less than an art.

Our buildings, of the most modern construction, were designed for the one purpose of producing *quality*. Our entire equipment was selected piece by piece, for the same final result—*quality*. Our raw materials have to pass the *quality* test.

"AGATHON" is our watchword.

And behind these "Agathon" buildings, this "Agathon" machinery, and this "Agathon" material, is our splendid corps of "Agathon" men.

We have set a *higher* standard—because particular buyers *demand* a higher standard.

Let us serve you.

The Central Steel Co.
MASSILLON, OHIO

Detroit Office, 326-27-28 Ford Building,
F. Walter Guibert, District Sales Manager

Say you saw it in THE IRON TRADE REVIEW

Light Co. has been incorporated; $12,000 capital stock; by W. H. Williams, Nettie L. Williams and Charles C. Williams.

JUNCTION CITY, KY.—Plans are under consideration for an electric light plant to be erected by a local company. Address the mayor.

ANDERSON, IND.—Lindberg Cutlery Co. has been incorporated; $5,000 capital stock; by Frederick Lindberg, William Vess and Charles A. Jackson.

AUBURN, IND.—DeKalb Mfg. Co. has been incorporated to manufacture motor vehicles; $150,000 capital stock; by William J. Allen J., and D. M. Vesey, of Auburn, Ind.

FORT WAYNE, IND.—Fuhrman Auto Co. has been incorporated; $10,000 capital stock; by W. J. Fuhrman, George DeWald and Clifford Beall.

INDIANAPOLIS. — Pathfinder Co., manufacturer of automobiles, has plans for a 60 x 400-foot addition.

INDIANAPOLIS.—National Motor Car Co. will build a $30,000 factory at Yandes and Twenty-second streets.

INDIANAPOLIS. — Century Post Co. has been incorporated to manufacture concrete machinery; $5,000 capital stock; by B. F. Cruesenbury, H. N. Elmore and I. Elmore.

INDIANAPOLIS.—Indiana Tool & Machinery Co. has been incorporated; $10.0 capital stock; by A. C. Berg, Carl Schubert and Hugo Miller.

INDIANAPOLIS, IND.—Indiana Tool & Machinery Co. has been incorporated to manufacture tools and machinery; $10,000 capital stock; by A. G. Berg, Joseph Lauler and C. Schubert.

KOKOMO, IND. — Apperson Bros. Co. is building an addition covering 150,000 square feet.

CHICAGO.—H. Root Foundry Co. is building a one-story addition.

CHICAGO.—Chicago Brass Products Co. has been incorporated; $20,000 capital stock; by Carl H. Stein, C. E. Rohenkohl and Harry V. Crocks, 111 West Monroe street.

CHICAGO.—National Carburetor Co. has been incorporated; $5,000 capital stock; by William A. Edward, Charles G. Lamb, William H. Williams and William P. Habel, 5418 West Jackson boulevard.

CHICAGO.—Northern Engineering & Construction Co. has been incorporated; $100,000 capital stock; by Isador L. Kulp, Edward J. Lumenschloss and Samuel T. Neely, 4037 North Kedvale avenue.

GALENA, ILL.—Interstate Light & Power Co. is considering adding a 3,500-horsepower turbine, boiler, pumps and automatic stokers. F. H. Rickemann is manager.

HAVANA, ILL.—Crescent Forging & Shovel Co. is planning to build an addition 60 x 200 feet.

MOLINE, ILL.—Moline Forging & Mfg. Co. has been incorporated; $21,000 capital stock; by Harry Ainsworth, Caldwell R. Rosborough and Arthur L. Warner.

OAK PARK, ILL.—National Engineering & Tool Wirks has been incorporated; $9,000 capital stock; by Walter H. Storm, Frank W. Hack and Theodore P. Schustek.

PEORIA, ILL.—A committee has reported that a proposed municipal electric light plant will cost $38,389. The proposition may be submitted to the voters. E. D. Jeffries is city engineer.

QUINCY, ILL.—Modern Iron Works, Geo. Fisher, manager, is making extensive changes in its plant to provide room for its mill room, office and sand and coke storage.

SPARTA, ILL.—Wm. McK. Brown, Cahokia building, East St. Louis, is taking bids on a water works plant to cost $60,000.

DETROIT. — Detroit Fuse Mfg. Co. is building an addition to its plant at 1400 Rivard street. Smith, Hinchman & Crylls are the archntects.

DETROIT.—Metal Products Co. is building a four-story factory, 60 x 100 feet. Nettleton & Weaver, 1405 Penobscot building, are the architects.

DETROIT.—Detroit Weatherproof Body Co. has been incorporated to manufacture automobile tops and bodies; $10,000 capital stock; by Charles Wilson, R. A. Allen and Lawrence Moore.

GRAND RAPIDS, MICH.—Adolph Leitelt Iron Works, which had been in existence 30 years, renewed its charter recently with a capital of $500,000 to continue the business.

MAUMEE, MICH.—Maumee has awarded T. C. Brooks & Son, Jackson, Mich., a contract for the construction of a water works system. The estimated cost of construction is about $49,000. Maumee Valley Electric Co. will furnish the power for pumping.

MUSKEGON HEIGHTS, MICH. — Piston Ring Co. has bought property adjacent to its plant and will build an addition.

MUSKEGON, MICH.—West Michigan Steel Foundry Co. has started work on a $25,000 addition to its plant. Plans also call for an office building to cost about $2,500.

TECUMSEH, MICH.—Plans are being prepared for a water works system to cost $15,000.

HARTFORD, WIS.—Ideal Heating & Ventilating Co., Milwaukee, has been awarded a contract for extending the municipal central steam heating plant and distribution system.

MADISON, WIS.—Kaestner & Hecht Co., Chicago, was awarded a contract for the elevator work in the north wing of the $7,500,000 state capitol at Madison. This is the final work on the building.

MARSHFIELD, WIS. — Felker Mfg. Co., Marshfield, will proceed with the erection of a 42 x 84-foot shop addition, to be devoted to the manufacture of steel culverts. The space vacated by the culvert shop will be used for barn equipment business. A small list of new equipment will be purchased.

MILWAUKEE.—Wisconsin Bridge & Iron Co. is having plans prepared for a foundry 80 x 270 feet.

MILWAUKEE.—Kempsmith Mfg. Co. manufacturer of milling machines, is building an addition and buying equipment.

MILWAUKEE.—Oil Gas Machine Co. has been incorporated; $25,000 capital stock; by Ernest O. Linton, Frank L. Blum and Harry M. Wink.

MILWAUKEE.—Sivyer Steel Casting Co., Greenfield, Wis., will erect a brick, concrete and steel shop addition, 75 x 90 feet. The steel contract has been awarded to the Milwaukee Structural Steel Co.

MILWAUKEE.—Thos. S. Watson Co., consulting engineer, 1412 Majestic building, Milwaukee, is taking figures on the steam heating plant for the shop and office addition of the Federal Malleable Co., Sixty-forth avenue, West Allis, and the heating plant for the remodeled plant of the Rockwell Mfg. Co., 572 Park street, Milwaukee.

MILWAUKEE.—W. F. Tubesing Co., 708 Ashland avenue, Chicago, has been awarded a contract for erecting a new warehouse and a new reservoir for the Chas. A. Krause Milling Co., Thirty-seventh avenue and Burnham street, Milwaukee. The warehouse will be of steel and corrugated iron, 2-story, 56 x 126 feet, and the reservoir of reinforced concrete, 80 x 140 feet.

RACINE, WIS.—Overland Aluminum Shoe Co., 912 Garfield street, is building a factory and foundry. George Kamm, 1301 Summit avenue, is the architect.

WAUKESHA, WIS.—Waukesha Motor Co. is building an addition. The former building will be remodeled for a machine shop.

INDEPENDENCE, MO. — Independence Stove Foundry Co. has bought a site and will build a foundry.

MACON, MO.—Bids will be received until Sept. 14, by J. L. Martin, City Clerk, for construction of a water works plant including pumps, motors and 300 tons of cast iron pipe. E. E. Harper is consulting engineer, 914 Grand Avenue Temple, Kansas City, Mo.

PLATTSBURG, MO.—Plans are being prepared by E. B. Murray, 920 Walnut street, Kansas City, Mo., for a $28,000 water works system.

ST. LOUIS.—Commercial Auto Body Co. has bought a site and will build a factory at Sixteenth and Pine street.

MARATHON, IA.—An election will be held in September on issuance of $12,000 in bonds for a municipal electric light plant.

CHAKOPEE, MINN.—Equity Stove Co. considers the erection of a factory.

MINNEAPOLIS.—Twin City Four-Wheel Drive Co. is having plans prepared for a factory to cost about $500,000.

ROCHESTER, MINN.—Bids will be asked soon on a municipal electric light plant to cost about $100,000. A. F. Wright is city clerk.

ST. CLOUD, MINN.—City of St. Cloud is having plans prepared for a $500,000 electric power plant.

THIEF RIVER FALLS, MINN.—City is having plans prepared for a $35,000 power plant.

SOUTHERN STATES

ALGIERS, LA.—M. L. & T. Railway & S. S. Co., Metropolitan Bank building, New Orleans, will build a machine and erecting shop at Algiers.

GRETNA, LA.—Bids will be asked soon on a proposed water works system costing $45,000. Frank T. Payne, city engineer.

NEW ORLEANS.—Morgan's Louisiana & Texas Railroad & Steamship Co. is expected shortly to be in the market for a number of machine tools.

WHITE CASTLE, LA.—Bonds for $25,000 have been voted for a water works system and electric light plant.

ELGIN, TEX.—Bids will be asked soon on a water works system to cost $11,000. J. W. Thomas is city secretary.

GRAHAM, TEX.—Texas Road Grader Mfg. Co. has been organized to manufacture road graders. R. L. Reed is president. It has not been decided whether a plant will be built.

SAN ANTONIO, TEX. — Blumberg Motor Mfg. Co. has been incorporated; $25,000 capital stock; by H. C. Blumberg, H. D. Hierholzer and Robert Butler.

ARKADELPHIA, ARK. — Arkansas Light & Power Co. has increased its capital stock from $650,000 to $2,250,000. This company has plants in several cities in Arkansas.

MAGNOLIA, ARK. — Standard Light & Ice Co. has surrendered its charter.

WALNUT, RIDGE, ARK.—Plans are being prepared for a $40,000 water works system. W. E. Belcate is commissioner.

MEMPHIS, TENN. — Florence Pump & Lumber Co. plans an addition. A considerable amount of new woodworking machinery will be installed.

NASHVILLE, TENN.—Kennedy & Baird are reported to be in the market for a small refrigerating plant.

NASHVILLE, TENN.—Nashville & Eastern Electric Railway Co. has been incorporated to build a line to extend from Lebanon, Tenn., to Smithville, Tenn., De Kalb county voted $150,000 to aid the enterprise. The incorporators are Guy Davis, G. C. Puckett, T. W. Wade, Charles Edwards, and Dibbrell Dinges, Smithville, Tenn.

SHELBYVILLE, TENN.—Public Light & Power Co. plans a new power plant 31 x 160 feet.

ADAMSON, OKLA.—Bids will be received Sept. 20 by the city council for installation of a municipal electric light plant.

TOMKAWA, OKLA.—City will buy a 20-

ampere, 3-phase, 2,300-volt, 60-cycle generator. V. K. Stanley is superintendent.

TULSA, OKLA.—Tulsa Engine & Foundry Co. has been incorporated to manufacture engines, hay bailers and other machinery; $50,000 capital stock; by Charles B. Parker and others.

WESTERN STATES

CRETE, NEB.—Bids will be asked soon by the county commissioner for a 290-foot steel bridge.

FAIRBURY, NEB.—County commissioners are planning construction of a 700-foot bridge to cost about $30,000 to replace the present structure.

HASTINGS, NEB.—Bids will be received until Sept. 13, by W. S. Watson, commissioner of light and power, for a 24-inch motor-driven deep well centrifugal pump of 1,000-gallon per minute capacity.

HASTINGS, NEB.—The municipal electric light plant is to add a 750-kilowatt steam turbo-generator, condensing plant and electrically driven deep well pump of 1,000-gallon per minute capacity. H. H. Cloyd is manager.

LINCOLN, NEB.—Lincoln Brass & Foundry Co. is to build an addition to its foundry.

TOBIAS, NEB.—J. C. Woberman is in the market for machine shop equipment.

ATTICA, KAS. — Bonds for $30,000 have been voted for a water works and municipal electric light plant.

ELLSWORTH, KAS.—Bids will be received until Sept. 18, by A. J. Klingenschmidt, county clerk, for a 280-foot reinforced concrete bridge.

KANSAS CITY, KAS.—Plans are being prepared by Harrington, Howard & Ash, engineers, Kansas City, Mo., for a high line bridge consisting of one 344-foot span and two 200-foot spans, to cost $500,000.

WICHITA, KAS.—Martin Metal Co. will build an addition to its plant.

CHOTEAU, MONT.—Contracts for the construction of a 200,000-gallon reservoir and 4½ miles of steel distributing mains has been awarded to F. E. Evans Contracting Co.

WHITEHALL, MONT.—Bids will be received until Sept. 23, by O. E. McCall, town clerk, for installing a water works system, including a motor, gasoline engine, pumps, steel tower and tank, mains and hydrants. George E. Baker, Whitehall, is consulting engineer.

MYTON, UTAH.—Bids will be received until Sept. 20, by R. B. Croix, town clerk, for a water works system, including a 50-foot steel tower and a 2½-foot centrifugal pump.

BOISE, IDA. — Nellie Mine, Horseshoe Bend, will install a 10-stamp mill.

POCATELLO, IDA.—Plans are being prepared for a heating plant in the roundhouse of the Oregon Short Line railroad. C. C. Kennicott, Salt Lake City, is the architect.

RUPERT, IDA.—City considers taking over the local electric light plant and making extensive improvements.

WALLACE, IDA.—John H. Wourms will install number of gas plants in northern Idaho. Plans include Wallace, Coeur d'Alene and Sand Point, in the project.

CHEHALIS, WASH.—Harry Alldis will rebuild the foundry recently damaged by fire.

OLYMPIA, WASH.—George Tilden, Seattle, has been granted a franchise to construct and operate electric power lines in Thurston county.

PAULSBO, WASH.—Plans are being prepared by G. N. Miller & Son, Burke building, Seattle, for a $10,000 water works system.

REARDAN, WASH.—Fisher Mfg. Co. will start the manufacture of wrenches shortly. Frank Fisher is president.

SEATTLE.—Pacific Coast Steamship Co. plans to convert the steamers SPOKANE and CITY OF SEATTLE into oil-burners. The estimated cost is about $50,000.

SEATTLE.—Salmon Bay Foundry Co. has been organized by John Wehn, S. Redick and others in Seattle. The company plans to build a foundry.

SEATTLE.—Hubbard Mfg. & Development Co. has decided to build a plant to manufacture Hubbard stump burners. W. R. Foley is president.

SEATTLE.—Jacquemine Auto Steel Wire Tire Co. has been incorporated to manufacture automobiles; $100,000 capital stock; by Eugene Jacquemine, Evan Gough and J. R. Cabanne.

SOUTH BEND, WASH.—Willapa Power Co. will start work shortly on the first unit of a hydro-electric plant near South Bend.

SPOKANE.—Plans have been completed for the erection of a 250-ton capacity mill at Jefferson mine, Coeur d'Alene, Ida. The estimated cost is about $100,000. An underground extension and electric haulage system is contemplated.

SUMNER, WASH.—Puget Sound Traction, Light & Power Co. will install a lighting system at Sumner.

TACOMA, WASH.—Tacoma Central Steam Heating Co. will proceed at once with the construction of a $200,000 plant.

WALLA WALLA, WASH.—Pacific Power & Light Co. has made an application for a franchise for a power line between Waitsburg and Prescott.

BEND, ORE.—Plans have been completed and construction will start shortly on a sawmill for Brooks-Scanlon Lumber Co. The mill will have a yearly capacity of 50,000,000 feet.

MARSHFIELD, ORE.—It is reported that the Willamette Pacific railroad will build shops and roundhouse at Marshfield.

ROSEBURG, ORE.—City council has been authorized to issue $250,000 in bonds for a water works and electric light plant.

LOS ANGELES. — Pittsburgh Foundry Co., East Twenty-second street, is building a foundry on East Forty-eighth street.

OAKLAND, CAL.—Bids will be received until Sept. 16, by W. S. McClure, state engineer, Sacramento, for a tank tower at the industrial home at Oakland.

SANTA BARBARA, CAL.—W. W. Alexander is having plans prepared by R. S. Sauter, architect, for a commercial garage and machine shop, 198 x 217 feet, costing $125,000.

$ Reward $

IS YOURS!

If you get action,
And wide awake salesmen,
Busy on these live tips,
Culled from a thousand sources,
DIVE IN!

The Factory Appliance Co., Illuminating building, Cleveland, O., is in the market for a number of tools, including engine lathes, lathes for drilling, automatic screw machines, turret lathes, grinding and milling machines.

The Carnegie Steel Co., Pittsburgh, is negotiating for six motor-driven lathes from 24 to 36 inches, and two 30-inch belt-driven lathes, completely equipped. The company is also inquiring for a large hydraulic press.

Bids will be received until Sept. 23 by O. E. McCall, town clerk, of Whitehall, Mont., for the installation of a waterworks system, including a motor, gas engine, pumps, steel tower and tank, mains and hydrants. George E. Baker, Whitehall, Mont., is consulting engineer.

The municipal electric light plant of Hastings, Neb., is to add a 750-kilowatt generator, condensing plant, an electrically driven pump with 1,000-gallon per minute capacity. H. H. Cloyd, manager.

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Special machines and other equipment will be installed by the Dayton Flatiron Works, Dayton, O. The company is enlarging the plant by a 150 x 300-foot addition.

CANADA

VANCOUVER.—Ford Lock Co. has been incorporated to manufacture automobile locks; $25,000 capital stock; by Ben P. Youmans, J. M. Hoff and George B. Simpson.

OTTAWA.—Auto Products Co., Ltd., has been incorporated to manufacture motor vehicles; $250,000 capital stock; by R. D. Bray, W. J. Halpin and others.

MONTREAL.—Canadian Metal Cap & Seal Co., Ltd., has been incorporated; $600,000 capital stock; by Leslie Boyd, Alexander R. Johnson and Arthur Ross.

NEW CATALOGS

ROCKING GRATES.—The Northern Foundry Co., La Porte, Ind., has issued a catalog describing and illustrating its line of rocking grates. The booklet bears the title of "Efficiency in Your Boiler Room". The construction of the company's line of rocking grates is explained in detail.

SHEET METAL PRODUCTS.—In a 168-page catalog, the Newport Rolling Mill Co., Newport, Ky., describes its sheet metal products, which range from plain, painted, or galvanized sheets to such diversified materials as culverts, ventilators, shingles, and portable houses.

TESTING APPARATUS.—An apparatus for determining the critical points of iron, steel and alloys is described in a 36-page booklet issued by the Scientific Materials Co., Pittsburgh, which contains interesting data on heat treatment of metals. This device utilizes the well-known principle of the thermic couple, in which differences of temperature create measurable electric impulses. The apparatus also includes a three-pen chronograph, an automatic electric alarm clock, and an automatic motor-driven reversible rheostat for regulating furnace temperatures. Other apparatus described includes an optical bench for the observation and photography of the microstructure of metals, a microscope, and metallographic grinding machines.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(Delivery to Dec. 31.)

Bessemer, valley	$16.00
Bessemer, Pittsburgh	16.70 to 16.95
Basic, Pittsburgh	15.45 to 15.95
Basic, eastern Pa.	17.00
Malleable, Pittsburgh	15.45 to 15.95
Malleable foundry, Chicago	13.50
Malleable foundry, Philadelphia	15.75 to 16.25
Malleable foundry, Buffalo	14.75 to 15.00
No. 1X foundry, Philadelphia	16.25 to 16.50
No. 2 foundry, Pittsburgh	15.45 to 15.95
No. 2 foundry, valley	14.50 to 15.00
No. 2 foundry, Cleveland	14.50 to 15.00
No. 2 foundry, Ironton	14.00
No. 2 foundry, Chicago	13.50
No. 2X foundry, Philadelphia	15.75 to 16.25
No. 2X fdy., N. J. tidewater	15.75 to 16.25
No. 2X foundry, Buffalo	14.75 to 15.00
No. 2 plain, Philadelphia	15.50 to 15.75
No. 2 plain, N. J. tidewater	15.25 to 15.75
No. 2 plain, Buffalo	14.50 to 14.75
No. 2 southern, Birmingham	11.00 to 11.50
No. 2 southern, Cincinnati	13.90 to 14.40
No. 2 southern, Chicago	14.50 to 15.00
No. 2 southern, Phila. delivery	15.50 to 16.00
No. 2 southern, Cleveland	15.00 to 15.50
No. 2 south'n, New York docks	15.50 to 16.00
No. 2 southern Boston, docks	15.50 to 16.00
No. 2 south. interior, New Eng.	16.50 to 17.50
No. 2 southern, St. Louis	15.90
Virginia No. 2X furnace	13.00 to 13.50
Virginia 2X, Philadelphia	15.75 to 16.25
Virginia 2X, Jersey City	16.10 to 16.60
Virginia 2X, Boston points	16.25 to 16.75
Gray forge, eastern Pa.	14.75 to 15.00
Gray forge, Pittsburgh	14.95 to 15.20
Gray forge, Birmingham	9.00
Silveries, 8 per cent, Jackson, O.	16.50 to 17.00
Silveries, 5 per cent Birmingham	13.00
Silveries, 5 per cent, Chicago	16.35
Standard low phos., Phila.	24.00 to 24.50
Lebanon low phos., furnace	19.00 to 20.00
Low phos., Pittsburgh	20.95 to 21.20
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	15.75 to 16.25
Charcoal, Buffalo	16.75 to 18.25
Charcoal, Birmingham	21.50

IRON ORE

Lake Superior Ores.

(Lower lake ports.)

Old range Bessemer, 55 per cent.	$3.75
Mesabi Bessemer, 55 per cent.	3.45
Old range, non-Bess., 51½ per cent.	3.00
Mesabi non-Bessemer, 51½ per cent.	2.80

Foreign Ores.

(Per unit Philadelphia.)
(Prices nominal.)

Foreign Bess., 50 to 65 per cent.	9 to 9½c
For'n non-Bes., 50 to 65 per cent.	9 to 9½c

COKE

(At the ovens)

Connellsville furnace	$1.65 to 1.75
Connellsville fur. contr.	1.75 to 2.00
Connellsville foundry	2.25 to 2.60
Connellsville fdy. contr.	2.35 to 2.60
Wise county furnace	2.00 to 2.25
Wise county foundry	2.40 to 2.60
Pocahontas furnace	2.00 to 2.50
Pocahontas foundry	2.25 to 2.50
New River, foundry	2.50 to 3.25
New River, furnace	2.25 to 2.50

FERRO-ALLOYS

Ferro mang., furnace (prompt)	110 to 125
Ferro mang., Balti. (future)	100.00
Spiegeleisen 20 per cent, furnace	26.00 to 28.00
Ferro-silicon, 50 per cent, Pbgh.	73.00 to 75.00
Ferro-silicon, 50 per cent, Phila.	73.00 to 75.00
Ferro-sil., 12 to 13 per cent.	22.00
Ferro-sil., 11 to 12 per cent.	21.00
Ferro-sil., 10 to 11 per cent.	20.00
Ferro-sil., 9 to 10 per cent.	19.00
(Ferro-silicon quoted at furnace Jackson and New Straitsville.)	Ashland,
Ferro-carbon titanium, carloads, per lb.	8c to 12½c
Ferro vanadium, Pbgh. per lb. alloy	2.25 to 2.30
Ferro tungsten, per lb. alloy, nom.	3.00 to 3.50
Ferro chrome, 4 to 6 per cent per lb., Niagara Falls	20c

SEMI-FINISHED STEEL

Open hearth billets, Phila.	$30.00 to 32.00
Forging billets, Phila.	34.00 to 38.00
Forging billets, Pbgh.	30.00 to 31.00

Freight Rates via Panama Canal

Rates on finished materials, including plates, shapes, bars, wire, nails, etc., to Pacific coast points via Panama canal, per 100 lbs., in carload lots, exclusive of insurance and dockage.

From New York	$0.40
From Pittsburgh	.619
From Youngstown	.619
From Niles	.619
From Wheeling	.619
From Steubenville	.619
From Johnstown	.604
From Coatesville	.545
From Steelton	.555
From Bethlehem	.529
From Cleveland	.65
From Chicago	.765

Wire rods, Pittsburgh	$28.00 to 29.00
Bess. bill., Youngstown	24.00 to 25.00
Open hearth billets, Youngstown	25.00 to 26.00
Bessemer billets, Pittsburgh	25.00
Open hearth billets, Pittsburgh	26.00
Bess. sheet bars, Youngstown	25.00
Op. h'th sheet bars, Youngstown	25.00 to 26.00
Bess. sheet bars, Pittsburgh	25.00 to 26.00
Op. h'th sh. bars, Pbgh.	26.00 to 26.50
Muck bar, Pittsburgh	27.00 to 28.00

RAILS AND TRACK MATERIAL

Stand. Bess., rails, Pbgh.	1.25c
Stand. open-hearth rails, Pbgh.	1.34c
Lgt. rails, 8-lbs., Pbgh. & Chgo.	1.25c to 1.30c
Lgt. rails, 12 lbs. Pbg. & Chgo.	1.17c
Lgt. rails, 16 to 20 lbs., Pgh. & Chgo.	1.12c
Lgt. rails, 25 to 45 lbs., Pbgh. and Chgo.	1.07c
Relaying rails, standard, Pbg. & Chgo.	$23.00 to 24.00
Relaying rails, light, Chgo.	21.50 to 22.50
Angle bars, st. sect. Pbgh. base.	1.50c
Angle bars, st. sections, Chicago	1.50c
Spikes, railroad, Pbgh.	1.50c to 1.55c
Spikes, railroad, Chgo.	1.65c to 1.70c
Track bolts, Pbgh.	2.00c to 2.10c
Track bolts, Chgo.	2.10c

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—	
Cleveland	$0.95
Newark, N. J.	2.98
Boston	3.18
Philadelphia	2.78
Pittsburgh	.95
St. Louis	3.18
Buffalo to:—	
Albany, N. Y.	$1.26
New England (all rail)	2.58
New York and Brooklyn (all rail).	2.58
New York and Brooklyn (by canal)	1.25 to 1.60
Virginia furnaces to:—	
Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88
Birmingham, Ala., to:—	
Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
New York (all rail)	6.15
New York (rail and water)	4.25
Philadelphia (all rail)	5.20
Philadelphia (rail and water)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75
Chicago, to:—	
Des Moines	$2.80
Milwaukee	.50
Moline, Ill.	1.40
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:—	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58

SHAPES, PLATES AND BARS

Structural shapes, Pittsburgh	1.35c
Structural shapes, Chgo.	1.54c
Structural shapes, Philadelphia.	1.509c
Structural shapes, New York.	1.519c
Struc. shapes, San Francisco.	2.00c to 2.05c
Tank plates, Chicago	1.49c to 1.54c
Tank plates, Pittsburgh	1.30c to 1.35c
Tank plates, Philadelphia	1.509c
Tank plates, New York	1.509c
Bars, soft steel, Pittsburgh	1.35c
Bars, soft steel, Chicago	1.54c
Bars, soft steel, Philadelphia	1.509c
Bars, soft steel, New York	1.469c
Hoops, carloads, Pittsburgh	1.40c
Bands, Pittsburgh	1.35c
Shafting, Pbgh., contr. car loads	64 off
Bar iron, Chicago	1.25c
Bar iron, Philadelphia	1.459c
Bar iron, New York	1.469c
Bar iron, Cleveland	1.30c to 1.35c
Bar iron, Pittsburgh	1.35c to 1.40c
Hard steel bars, Chicago	1.30c to 1.35c
Smooth finish, mchy. steel, Chi.	1.68c

SHEETS AND TIN PLATE

No. 28, black, Pittsburgh	1.90c
No. 28, black, Chicago	2.04c
No. 28, tin mill, black, Pbgh.	1.85c
No. 28, galvanized, Pbgh. nom.	3.75c to 4.00c
No. 28, galvanized, Chgo.	3.69c to 3.94c
No. 10, blue, anld., Pbgh.	1.50c
No. 10, blue, annealed, Phila.	1.659c to 1.759c
Tin plate, 100 lb., coke base.	3.10c to 3.20c

EXTRAS FOR SHEET OR TIN MILL SPECIFICATIONS

(Per hundred pounds.)

Single pickled, cold roll, and re-anl.	30 cents
Hot roll'd pick'd and anl., tin mill	25 cents
Full pickl'd, cold rolled and re-anl.	50 cents
Auto sheets	75 cents
Blued stove pipe stock	10 cents
Range steel	30 cents
Re-squarring	10 cents
Roller leveling	10 cents
Patent leveling and re-squarring	35 cents
Oiling sheets	10 cents
Deoxidizing	10 cents
Lime finish	10 cents
Open-hearth stamping steel, free from mill scale	55 cents
Special open hearth deep stpg. steel free from mill scale	80 cents
Extra deep special auto body stock	$1.25
Ext. for 28 gage ov. 32 to 36-in. wide	10 cents

No reduction for sheets not annealed.

The above extras apply on both sheet and tin mill specifications, at the same rate.

IRON AND STEEL PIPE

(Pittsburgh.)

	Black. Butt-weld.	Galv. Butt-weld.
Steel, ¾ to 3 inches	79	63½
Iron, ¾ to 2½ inches	71	52
	Lap-weld.	
Steel, 2½ to 6 inches	78	62½

BOILER TUBES

Steel, 3½ to 4½ inches l. c. l.	72
Iron, 3½ to 4½ inches l. c. l.	61

WIRE PRODUCTS

(Retailers' price 5 cents above jobbers' quotation.)

Wire nail jobbers, Pittsburgh	$1.65
Plain wire, jobbers, Pittsburgh	1.50
Galvanized wire, jobbers, Pbgh.	2.20
Polished staples, Pbgh.	1.80
Galvanized staples, Pbgh.	2.50
Barb wire, painted, jobbers, Pbgh.	1.80
Barb wire, galv., jobbers, Pbgh.	2.50